NASA Technical Paper 1090

Effects of Deflected Thrust on the Longitudinal Aerodynamic Characteristics of a Close-Coupled Wing-Canard Configuration

Long P. Yip and John W. Paulson, Jr.

DECEMBER 1977

NASA

NASA Technical Paper 1090

Effects of Deflected Thrust on the Longitudinal Aerodynamic Characteristics of a Close-Coupled Wing-Canard Configuration

Long P. Yip and John W. Paulson, Jr.
Langley Research Center
Hampton, Virginia

NASA
National Aeronautics
and Space Administration

Scientific and Technical
Information Office

1977

SUMMARY

An investigation has been conducted in the Langley V/STOL tunnel to investigate the effects of power on the longitudinal aerodynamic characteristics of a close-coupled wing-canard fighter configuration with partial-span rectangular nozzles at the trailing edge of the wing. Data were obtained on a basic wing-fuselage (wing-alone) configuration, a wing-canard configuration, and a wing-canard-strake configuration for nozzle and flap deflections from 0° to 30° and for nominal thrust coefficients from 0 to 0.30. The model was tested over an angle-of-attack range from -2° to 40° at Mach numbers of 0.15 and 0.18.

Results show substantial improvements in lift-curve slope, in maximum lift, and in drag-due-to-lift efficiency when the canard and strakes have been added to the basic wing-fuselage (wing-alone) configuration. Addition of power increased both lift-curve slope and maximum lift, improved longitudinal stability, and reduced drag due to lift on both the wing-canard and wing-canard-strake configurations. These beneficial effects are primarily derived from boundary-layer control due to moderate thrust coefficients which delay flow separation on the nozzles and inboard portion of the wing flaps.

INTRODUCTION

Previous results from tests of an unpowered (ref. 1) fighter research model showed significant improvement in maximum lift coefficient when a canard and canard strake were added to the basic wing planform; however, the increase in maximum lift coefficient was accompanied by a rather high static longitudinal instability, owing to the vortex lift generated from the canard strakes and flow separation over the trailing-edge flaps.

One possible solution to the pitch-up problem was to incorporate two-dimensional nozzles at the wing trailing edge in hopes of obtaining favorable jet-induced effects. (See refs. 2 and 3.) A larger scale model identical in shape to the model in reference 1 was built, but this second model had two-dimensional rectangular nozzles at the trailing edge near the wing root.

The present investigation was conducted in the Langley V/STOL tunnel to determine the effects of power on the longitudinal aerodynamic characteristics of the configuration in reference 1. Data were obtained for the wing-alone configuration with and without the canard and canard strake at angles of attack between -2° and 40° at Mach numbers of 0.15 and 0.18. Nozzle and flap deflections ranged from 0° to 30°, and thrust coefficients ranged nominally from 0 to 0.30. In testing this model, nominal thrust coefficients of 0.20 and 0.30 were used because these coefficients were representative of coefficients available in advanced transonic fighters in the maneuver mode.

Simulation of one-on-one combat with similar aircraft in the Langley differential maneuvering simulator has produced time histories of altitude plotted against Mach number. When evenly matched aircraft engage in a sustained one-on-one engagement, their performance quickly degenerates to subsonic speeds; a clearly superior design, on the other hand, can end the engagement while maintaining near original altitude and speed. It is unlikely that an aircraft would fall to the lower speeds because of increased vulnerability to both ground attack and air attack from more than one aircraft. However, some conditions necessitate an absolute one-on-one engagement, and the experimental results at low Mach numbers reported in this paper apply directly to those conditions.

The degree to which the data obtained at low Mach numbers are applicable to the higher speeds depends on the slenderness of the configuration and the design stage for which data are required. The equivalence theory of Oswatitsch and Keune (ref. 4) states that for slender bodies, the flow is governed (1) by a longitudinal potential dependent on the equivalent area distribution and the Mach number, and (2) by a cross-flow potential dependent only on the local cross section and independent of the Mach number. The vortex lift developed on slender configurations is dominated by the cross-flow conditions. Therefore, it seems reasonable that planform shaping and interference flow-field studies conducted at low speeds during the preliminary design stage would provide a valuable insight into the lift-dominated flow fields that are encountered during maneuvering at transonic speeds. The detailed design for desired pressures on the aircraft above the critical Mach number dictates, of course, the use of nonlinear design methods and wind-tunnel testing at the higher design Mach numbers (ref. 5).

SYMBOLS

All data have been reduced to standard coefficient form and are presented in the stability axis system. The model moment center was at -6 percent of the wing mean aerodynamic chord. All measurements and calculations were made in U.S. Customary Units; however, all data contained in this report are given in both S.I. and U.S. Customary Units. (See ref. 6.) Because some symbols appear in a different form in the tabulated printout, the printout forms are given in parentheses at the end of the appropriate definitions.

A aspect ratio

b wing span, m (ft)

b_f span of wing flap, m (ft)

b_N span of nozzle, m (ft)

C_D net force coefficient in drag direction, $\frac{\text{Drag}}{q_\infty S}$ (CD in tabulated printout)

$C_{D,e}$ equivalent thrust-removed force coefficient in drag direction, $C_D + C_T \cos(\alpha + \delta_N)$ (CDE in tabulated printout)

$C_{D,o}$ drag coefficient at zero lift of wing canard with 0° flap deflection and nozzles removed

C_m pitching-moment coefficient, $\frac{\text{Pitching moment}}{q_\infty S\bar{c}}$ (CM in tabulated printout)

$C_{m,e}$ equivalent thrust-removed pitching-moment coefficient, $C_m + 0.9C_T \sin(\delta_N)$ (CME in tabulated printout)

C_L lift coefficient, $\frac{\text{Lift}}{q_\infty S}$ (CL in tabulated printout)

C_{L_α} lift-curve slope, deg^{-1}

$C_{L,e}$ equivalent thrust-removed lift coefficient, $C_L - C_T \sin(\alpha + \delta_N)$ (CLE in tabulated printout)

C_T thrust coefficient, $\frac{\text{Thrust}}{q_\infty S}$ (CT in tabulated printout)

c wing or canard chord, m (ft)

$\bar{c}$ wing mean aerodynamic chord, m (ft)

e drag-due-to-lift efficiency parameter, $\frac{C_L^2}{(C_D - C_{D,o})\pi A}$

q_∞ free-stream dynamic pressure, Pa (lbf/ft^2)

S wing or canard area, m^2 (ft^2)

t maximum thickness

x,y,z body axes distances, m (ft)

α angle of attack, deg (ALPHA in tabulated printout)

δ deflection of flap or nozzle, deg

Λ sweep angle, deg

Subscripts:

c canard

f flap

le leading edge

N nozzle

MODEL DESCRIPTION AND TEST CONDITIONS

The wind-tunnel model was a larger scale model of the close-coupled wing-canard configuration in reference 1. The model is shown installed in the Langley V/STOL tunnel in figures 1 and 2. A three-view drawing of the model is shown in figure 3(a), strake geometry is shown in figure 3(b), and pertinent dimensions are given in table I. This wing had an untwisted planform with circular-arc airfoil sections with a thickness which varied linearly from $t/2 = 0.06$ at the root to $t/2 = 0.04$ at the tip. This model geometry is a scaled up model of reference 1 except that two-dimensional straight-duct rectangular nozzles at the wing trailing edge have been added as shown in figure 4. These nozzles were deflected along with and independent of the wing flaps over a range from 0° to 30°. The wing, canard, and strake were removable, and various combinations of components with various nozzle and flap deflections were investigated as shown in table II. The nozzle-off configuration (runs 350 and 353) implies that the nozzles were removed and replaced with the wing trailing edge.

Power was supplied to the model with high pressure air through a plenum chamber in the model with separate air lines to each nozzle. Static calibrations were made to determine the thrust levels of each nozzle. Each nozzle was individually controlled, and the nozzle thrust was set by the supply valves to give zero rolling moments. Once the nozzles had been balanced, the thrust was held constant throughout each run. The thrust coefficients were obtained by varying q_∞ while holding the nozzle thrust constant. The values of q_∞ were 2.39 kPa (50 lbf/ft^2) for $C_T = 0$ and 0.20 and 1.48 kPa (31 lbf/ft^2) for $C_T = 0.30$. These values correspond to Reynolds numbers (based on mean aerodynamic chord) of 1.51×10^6 and 1.20×10^6, respectively.

Model instrumentation consisted of an internal strain-gage balance to measure forces and moments, an accelerometer to measure angle of attack, and pressure transducers to monitor thrust levels.

The test was conducted in two phases: a high-angle-of-attack phase, $\alpha = 12°$ to 40°, and a low-angle-of-attack phase, $\alpha = -2°$ to 26°. Overlapping data occurred from $\alpha = 12°$ to 26°.

Blockage, jet-boundary, and chamber pressure corrections were small and were, therefore, not applied.

PRESENTATION OF RESULTS

The longitudinal aerodynamic characteristics for configurations with fuselage and wing alone (this configuration is referred to as wing alone); wing and canard; and wing, canard, and strake are presented in tabular as well as in plotted form. The tables and figures show effects of nozzle deflections, flap deflections, and power settings. From analyses of reference 1 data and of results of the vortex-lattice theory (refs. 7 to 9), the model moment center was located so that a $\partial C_m/\partial C_L = 0.05$ could be obtained for the wing-canard configuration at an angle of attack of 0°. Table II identifies the configurations associated with the run numbers used in the wind-tunnel tests. Test

results are presented in table III. Included in the tabulated results are the angle of attack, thrust coefficients, and longitudinal aerodynamic characteristics with thrust effects included and thrust component removed. The longitudinal aerodynamic data are presented as follows:

	Figure
Wing-alone configuration:	
Effect of nozzle deflection and flap deflection	5
Effect of thrust coefficient	6
Wing-canard configuration:	
Effect of deflecting the nozzles alone	7
Effect of deflecting both the nozzles and the flaps	8
Effect of thrust coefficient	9
Wing-canard-strake configuration:	
Effect of deflecting the nozzles alone	10
Effect of deflecting both the nozzles and the flaps	11
Effect of thrust coefficient	12
Data summary:	
Effect of adding canard and strake to the wing-alone configuration	13, 14
Data analysis:	
Thrust-removed longitudinal aerodynamic characteristics	15 to 18
Comparison of wing-alone data with jet-flap theory at two thrust coefficients	19

DISCUSSION

Wing-Alone Configuration

The longitudinal aerodynamic characteristics of the wing-alone configuration are presented in figures 5 and 6. The power-off data ($C_T = 0$) indicate the expected increases in lift and nose-down pitching moment when the flaps and nozzles are deflected 10° to 20°. However, when the deflections are increased to 30°, the additional increments in C_L and C_m are small. Power ($C_T = 0.21$ or 0.32) tends to increase the increments in C_L and C_m when the flaps and nozzles are deflected from 20° to 30°. However, the increments are not as large as those from 0° to 10° or 10° to 20°. Power also extends the lift curve beyond the power-off stall angle of attack and increases C_{L_α}.

Wing-Canard Characteristics

The longitudinal aerodynamic characteristics of the wing-canard configuration are presented in figures 7 to 9. The effects of power and flap deflection on the wing-canard configuration are similar to the effects on the wing-alone

configuration. The addition of the canard substantially increased C_{L_α}, improved the drag polar, and reduced configuration stability.

Wing-Canard-Strake Configuration

The longitudinal aerodynamic characteristics of the wing-canard-strake configuration are presented in figures 10 to 12. These data again show the same trends as the other configurations. The following two trends are common to the strake-on data:

(1) A sharp break in the pitching-moment curve occurs at $\alpha = 25^\circ$. The discussion of stability characteristics is limited to data below this break.

(2) There is a region of overlapping data between $\alpha = 12^\circ$ and 26° where the data may not repeat. Because of the large angle-of-attack range, -2° to 40°, the data were obtained in two phases: a low-angle-of-attack phase, -2° to 26°, and a high-angle-of-attack phase, 12° to 40°. The strake-canard flow field appears to develop differently if the model is set initially at $\alpha = 12^\circ$ and is pitched to 40° than if the model is pitched from -2° to 26°. This difference was confirmed by placing the model at $\alpha = 12^\circ$ during the low-angle-of-attack phase starting the tunnel, and pitching the model at $\alpha = 26^\circ$. These data followed the high-angle-of-attack phase data which indicate that the differences are related to flow rather than to test hardware.

Summary of Configuration Effects

A summary of the configuration effects on the longitudinal aerodynamic characteristics is given in figures 13 and 14. In each plot, the three configurations tested (that is, wing alone, wing canard, and wing canard strake) are presented at various flap and nozzle deflections and nominal thrust coefficients. The general trends of configuration effects are to increase C_L at higher angles of attack as the canard and strake are added, to decrease stability to near a neutral condition when the canard is added and to decrease stability further to an unstable condition at high C_L when the strake is also added, and to improve the drag polars as the canard and strake are added. Power effects and flap deflections vary the levels of those configuration effects, but the basic trend is consistent throughout the data.

A detailed plot of stability levels ($\partial C_m/\partial C_L$) for the various configurations is given in figure 14(a). Although there are local variations in $\partial C_m/\partial C_L$ as C_L increase, the trend is to decrease stability as the canard is added and to decrease stability further as the strake is also added.

The effect of power on stability across the C_L range is the same for both the undeflected and the deflected flap and nozzle configurations. The effect of power reduces the instabilities across the C_L range and increases the C_L that can be obtained for a given level of stability. For example, power effects on the wing-canard-strake configuration reduce the configuration instability at $C_L = 1.0$ from $\partial C_m/\partial C_L = 0.10$ with $C_T = 0$ to $\partial C_m/\partial C_L = 0.04$ with

$C_T = 0.30$. On the same configuration, power increased the maximum obtainable C_L from 1.5 to 2.3 for instability levels less than $\partial C_m/\partial C_L = 0.15$.

Figure 14(b) shows the effects of canard, canard and strake, flap and nozzle deflections, and power on the drag-due-to-lift efficiency factor e as a function of C_L. The calculation of e was made using $C_{D,o}$ from the nozzle-off configuration (runs 350 and 353). Adding a canard significantly increases the lift before viscous drag rise occurs. Adding also the strake slightly increases the efficiency and also the maximum lift obtained for a given value of e. Adding undeflected power on the wing-canard-strake configuration increases the lift from $C_L = 1.9$ to $C_L = 2.2$ before viscous drag rise occurs. Deflecting the flaps and nozzles increases the efficiency significantly. Deflected power effects on the configuration at $C_L = 1.0$ increases the efficiency to a value of $e = 0.9$. The maximum lift obtained before viscous drag rise occurs is $C_L = 2.6$.

Induced Aerodynamic Effects of Power

Analyses of the induced aerodynamic effects of power on various configurations are presented in figures 15 and 17 as plots of the equivalent thrust-removed drag and pitching moment against the equivalent thrust-removed lift. The equivalent thrust-removed data are defined by the following equations:

$$C_{L,e} = C_L - C_T \sin (\alpha + \delta_N)$$

$$C_{D,e} = C_D + C_T \cos (\alpha + \delta_N)$$

$$C_{m,e} = C_m + 0.9C_T \sin (\delta_N)$$

where C_T is based on static thrust calibration and the 0.9 is the distance from the moment reference center to the nozzle hinge point expressed as a fraction of $\bar{c}$. In comparing equivalent thrust-removed data, the benefits due to thrust over the direct thrust contribution to lift, drag, and pitching moment can be shown.

Power has little effect on the longitudinal aerodynamics of the wing-alone configuration (fig. 15) with $\delta_f = \delta_N = 0^\circ$. At $\delta_f = \delta_N = 30^\circ$, addition of power apparently reduces the flow separation over the nozzles and flaps because there is a reduction in the drag, an increase in stability, and an increase in C_{L_α}.

On the wing-canard configuration (fig. 16), there are again slight improvements in the longitudinal aerodynamic characteristics due to power with the flaps and nozzles undeflected. With the deflection of the nozzles alone, the power-induced aerodynamic effects are an increase in C_{L_α}, an increase in configuration stability, and a reduction of the drag throughout the C_L range. With $\delta_f = \delta_N = 30^\circ$, the power-induced effects are similar to those of deflect-

ing the nozzles alone, and thus show that most of the induced effects are due to nozzle-alone deflection.

The discussion of power-induced effects on stability for the wing-canard-strake configuration (fig. 17) is complicated by the region of overlap in the data where C_m may not repeat from the low-angle-of-attack phase to the high-angle-of-attack phase of the test. The increment between power-on and power-off stability for the low-angle-of-attack data is identical to those increments present in the wing-canard data. For example, the change in stability from power-off to power-on for the wing-canard or the wing-canard-strake configuration is about $\Delta(\partial C_m/\partial C_L) = -0.06$ at $\alpha = 20^\circ$. However, for the high-angle-of-attack phase of the test, the power-induced change in stability is -0.11. The general trends from power-induced effects on longitudinal aerodynamics of the wing-canard-strake configuration are the same as those trends for the wing-canard and wing-alone configurations. Power increases C_L, reduces the configuration instability, and reduces the drag levels by increments similar to those experienced with the wing-canard configuration. These effects indicate that the significant contribution of power comes from delaying flow separation, that is, boundary-layer control over the nozzles and part of the flaps. In general, there is little additional improvement in longitudinal aerodynamic characteristics by increasing C_T from 0.20 to 0.30.

Figure 18 shows the effects of adding canard, adding canard and strake, deflecting flaps and nozzles, and adding power on the drag-due-to-lift parameter $(C_{D,e} - C_{D,o})/C_{L,e}^2$, in effect $1/(\pi Ae)$. This parameter is indicative of the drag-due-to-lift efficiency. Figure 18 is similar to figure 14(b) which shows these same effects on e (but without the thrust removed). Adding the canard significantly increases the lift before viscous drag rise occurs. Additional increases in lift before viscous drag rise occurs can be obtained by adding strakes and power. Flap and nozzle deflections tend to reduce the drag due to lift. Addition of power with the flaps and nozzles deflected reduces the drag due to lift even further. Since this model was designed to obtain overall planform and power effects, no attempt was made to trim the configuration. In order to obtain trimmed high lift coefficients, where the drag due to lift approaches the theoretical minimum, improved camber, twist, thickness distributions, and wing-canard planforms are required. (See ref. 10.)

Jet-Flap Theory Analysis

A theoretical method for calculating the aerodynamic characteristics of jet-flapped wings (ref. 11) was used to analyze the power effects for the wing-alone configuration. The theory of reference 11 is a lifting-surface program that represents the wing and the jet wake with a vortex sheet of varying strength. Since the program assumes an inviscid theory, it cannot predict the flow separation on the model wing. However, application of this theory to a jet-flap model has shown good agreement between the theoretical predictions and the experimental data in the angle-of-attack region before viscous effects become predominant (ref. 12).

A comparison of the jet-flap theory predictions with data from the wing-alone configuration is shown in figure 19 for various settings of nozzle and

flap deflections at constant power settings. The theory accurately predicted C_L and C_{L_α} up to the stall region for flap and nozzle deflections up to 20°.

With $\delta_f = \delta_N = 30°$, the theory overpredicted the lift and thus indicated flow separation on the flap. With power on and $\delta_f = \delta_N = 30°$, the experimental lift curve is in closer agreement with theory because the separated flow near the nozzle is reduced. However, the lift is still overpredicted because there is flow separation on the outboard flaps.

The level of stability predicted by theory is in good agreement with the data. However, the magnitude of C_m has been overpredicted. In inviscid theory, high suction pressures are predicted in the region near the hinge of a deflected flap. In reality, the peak suction pressures are not as large as those predicted by theory. The agreement between theory and experiment is better for power-on conditions than for power-off conditions because flow separation near the nozzle is reduced for power-on conditions. The power-on pitching-moment data for flap and nozzle deflections of 20° or less show values of C_m which are approximately two-thirds of the theory estimates.

SUMMARY OF RESULTS

The results of an investigation on the effects of deflected thrust on the longitudinal aerodynamic characteristics of a close-coupled wing-canard fighter configuration indicated the following:

1. Results show substantial improvements in lift and drag due to lift with the addition of the canard and strake to the wing-alone configuration. Adding a canard substantially increases the lift before viscous drag rise occurs.

2. In general, the addition of power increases the lift-curve slope and maximum lift coefficient, reduces configuration instability, and opens up the drag polars. These effects indicate that the major effect of power comes from boundary-layer control. There is little improvement in induced longitudinal aerodynamic characteristics by increasing the thrust coefficient from 0.20 to 0.30.

3. Most of the improvements from power-induced effects come from deflecting the nozzles alone.

4. Comparison of wing-alone data with jet-flap theory supports the indication that power reduces the separation associated with high flap and nozzle deflections.

Langley Research Center
National Aeronautics and Space Administration
Hampton, VA 23665
December 2, 1977

REFERENCES

1. Gloss, Blair B.: Effect of Wing Planform and Canard Location and Geometry on the Longitudinal Aerodynamic Characteristics of a Close-Coupled Canard Wing Model at Subsonic Speeds. NASA TN D-7910, 1975.

2. Winston, Matthew M.; Weston, Robert P.; and Mineck, Raymond E.: Propulsion-Induced Aerodynamic Interference Effects on Jet-Lift VTOL Aircraft. AIAA Paper No. 75-1215, Sept.-Oct. 1975.

3. Capone, Francis J.: Supercirculation Effects Induced by Vectoring a Partial-Span Rectangular Jet. J. Aircraft, vol. 12, no. 8, Aug. 1975, pp. 633-638.

4. Ashley, Holt; and Landahl, Marten: Aerodynamics of Wings and Bodies. Addison-Wesley Pub. Co., Inc., c.1965.

5. Thomas, J.; Paulson, J.; and Yip, L.: Effects of Deflected Thrust on the Stability and Performance Characteristics of a Close-Coupled Canard Fighter Configuration. AIAA Paper No. 77-887, July 1977.

6. Mechtly, E. A.: The International System of Units - Physical Constants and Conversion Factors (Second Revision). NASA SP-7012, 1973.

7. Tulinius, J.; Clever, W.; Niemann, A.; Dunn, K.; and Gaither, B.: Theoretical Prediction of Airplane Stability Derivatives at Subcritical Speeds. NASA CR-132681, 1975.

8. Paulson, John W., Jr.: Applications of Vortex-Lattice Theory to Preliminary Aerodynamic Design. Vortex-Lattice Utilization, NASA SP-405, 1976, pp. 113-126.

9. Paulson, John W., Jr.; Thomas, James L.; and Yip, Long P.: Low-Speed Power Effects on Advanced Fighter Configurations With Two-Dimensional Deflected Thrust. NASA TM X-74010, 1977.

10. Tulinius, Jan R.; and Margason, Richard J.: Aircraft Aerodynamics Design and Evaluation Methods. AIAA Paper 76-15, Jan. 1976.

11. Goldhammer, M. I.; Lopez, M. L.; and Shen, C. C.: Methods for Predicting the Aerodynamic and Stability and Control Characteristics of STOL Aircraft. Volume I - Basic Theoretical Methods. AFFDL-TR-73-146-Vol. I, U.S. Air Force, Dec. 1973.

12. Gainer, Thomas G.; Yip, Long P.; and Vogler, Raymond D.: Comparison of Aerodynamic Theory and Experiment for Jet-Flap Wings. Powered-Lift Aerodynamics and Acoustics, NASA SP-406, 1976, pp. 103-118.

TABLE I.- BASIC MODEL GEOMETRY

Body:	
Length, cm (in.)	231.65 (91.20)
Width, cm (in.)	18.29 (7.20)
Wing:	
A	2.5
S, m^2 (ft^2)	0.59 (6.40)
b, m (ft)	1.22 (4.00)
Λ_{le}, deg	44
$\bar{c}$, cm (in.)	55.98 (22.04)
c_{root}, cm (in.)	81.26 (31.99)
c_{tip}, cm (in.)	16.28 (6.41)
Moment center -0.06c model station from nose, cm (in.)	135.66 (53.41)
Airfoil:	
Section	Circular-arc
t/c at root	0.06
t/c at tip	0.04
Wing flap:	
b_f, m (ft)	0.38 (1.25)
c_f inboard, cm (in.)	11.05 (4.35)
c_f outboard, cm (in.)	3.30 (1.30)
Nozzles:	
b_N, m (ft)	0.14 (0.45)
c_N inboard, cm (in.)	10.29 (4.05)
c_N outboard, cm (in.)	8.76 (3.45)
Canard:	
S_c, m^2 (ft^2)	0.17 (1.79)
b_c, m (ft)	0.83 (2.72)
Λ_{le}, deg	5.17
c_{root}, cm (in.)	52.73 (20.76)
c_{tip}, cm (in.)	8.59 (3.38)
Airfoil	Circular arc
t/c at root	0.06
t/c at tip	0.04
Height of canard above wing, cm (in.)	11.43 (4.50)

TABLE II.- TEST CONFIGURATIONS

Run	Configuration	δ_N, deg	δ_f, deg	C_T
28	Wing alone	0	0	0
29	↓	↓	↓	.21
30	↓	↓	↓	.32
86	↓	10	10	0
87	↓	↓	↓	.21
88	↓	↓	↓	.32
83	↓	20	20	0
84	↓	↓	↓	.21
85	↓	↓	↓	.32
80	↓	30	30	0
81	↓	↓	↓	.21
82	↓	↓	↓	.32
350, 353	Wing canard	Off	0	0
334, 390	↓	0	↓	0
335, 391	↓	↓	↓	.20
336, 392	↓	↓	↓	.30
341, 387	↓	10	↓	0
342, 388	↓	↓	↓	.20
343, 389	↓	↓	↓	.30
337, 384	↓	30	↓	0
339, 385	↓	↓	↓	.20
340, 386	↓	↓	↓	.30
344, 394	↓	10	10	0
345, 395	↓	↓	↓	.20
346, 396	↓	↓	↓	.30

TABLE II.- Concluded

Run	Configuration	δ_N, deg	δ_f, deg	C_T
347, 381	Wing canard	30	30	0
348, 382				.20
349, 383				.30
351, 352	Wing canard strake	Off	0	0
313, 355		0		0
314, 356				.20
315, 357				.30
316, 358		10		0
317, 359				.20
318, 360				.30
322, 361		20		0
323, 362				.20
324, 363				.30
319, 364		30		0
320, 365				.20
321, 366				.30
309, 372		10	10	0
310, 373				.20
311, 374				.30
306, 375		20	20	0
307, 376				.20
308, 377				.30
305, 378		30	30	0
304, 379				.20
303, 380				.30

TABLE III.- TABULATED LONGITUDINAL AERODYNAMIC CHARACTERISTICS

Wing alone: $\delta_N = 0^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0$

RUN 28

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.95	-.0810	.0215	.0183	0.0000	-.0810	.0215	.0183
.01	.0162	.0221	-.0083	0.0000	.0162	.0221	-.0083
2.05	.1201	.0250	-.0370	0.0000	.1201	.0250	-.0370
4.03	.2238	.0317	-.0664	0.0000	.2238	.0317	-.0664
6.01	.3393	.0458	-.0984	0.0000	.3393	.0458	-.0984
7.99	.4459	.0676	-.1250	0.0000	.4459	.0676	-.1250
10.02	.5389	.0975	-.1487	0.0000	.5389	.0975	-.1487
11.95	.6237	.1327	-.1751	0.0000	.6237	.1327	-.1751
14.05	.7168	.1792	-.2092	0.0000	.7168	.1792	-.2092
15.91	.7991	.2254	-.2369	0.0000	.7991	.2254	-.2369
17.97	.8356	.2769	-.2788	0.0000	.8356	.2769	-.2788
20.00	.8577	.3245	-.3159	0.0000	.8577	.3245	-.3159
21.94	.8916	.3712	-.3359	0.0000	.8916	.3712	-.3359

Wing alone: $\delta_N = 0^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0.21$

RUN [illegible]

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.93	-.0885	-.2045	.0144	.2139	-.0813	.0093	.0144
.02	.0104	-.2043	-.0108	.2143	.0103	.0100	-.0108
2.04	.1238	-.2003	-.0394	.2155	.1141	.0150	-.0394
4.10	.2498	-.1903	-.0711	.2162	.2349	.0253	-.0711
6.05	.3651	-.1750	-.1020	.2167	.3473	.0400	-.1020
8.13	.4830	-.1520	-.1300	.2163	.4526	.0671	-.1300
10.01	.5841	-.1228	-.1532	.2168	.5444	.0907	-.1532
12.03	.6829	-.0843	-.1824	.2166	.6377	.1276	-.1824
14.03	.7849	-.0351	-.2174	.2150	.7377	.1735	-.2174
15.94	.8629	.0136	-.2457	.2145	.8049	.2148	-.2457
17.93	.9296	.0702	-.2925	.2151	.8634	.2749	-.2925
20.07	.9774	.1271	-.3413	.2149	.9034	.3290	-.3413

Wing alone: $\delta_N = 0^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0.32$

RUN 30

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.93	-.1010	-.3208	.0114	.3274	-.0900	.0067	.0114
.12	.0201	-.3189	-.0189	.3270	.0194	.0081	-.0189
2.06	.1304	-.3131	-.0452	.3270	.1187	.0137	-.0452
3.98	.2507	-.3026	-.0743	.3270	.2280	.0236	-.0743
5.95	.3707	-.2845	-.1044	.3271	.3368	.0409	-.1044
8.03	.4874	-.2590	-.1350	.3273	.4417	.0651	-.1350
10.03	.5928	-.2274	-.1595	.3264	.5355	.0936	-.1595
11.97	.6957	-.1929	-.1838	.3265	.6280	.1265	-.1838
14.05	.8030	-.1459	-.2152	.3259	.7239	.17[illegible]	-.2152
16.03	.8968	-.0932	-.2463	.3254	.8048	.2195	-.2465
17.97	.9585	-.0405	-.2873	.3258	.8589	.2695	-.2873
19.96	1.0209	.0211	-.3407	.3248	.9181	.3264	-.3407

Wing alone: $\delta_N = 10^{\circ}$; $\delta_f = 10^{\circ}$; $C_T = 0$

RUN 96

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-2.01	.1198	.0238	-.1159	0.0000	.1198	.0238	-.1159
-.03	.2232	.0254	-.1442	0.0000	.2232	.0254	-.1442
2.08	.3274	.0309	-.1716	0.0000	.3274	.0309	-.1716
4.00	.4373	.0437	-.2019	0.0000	.4373	.0437	-.2019
6.01	.5509	.0668	-.2327	0.0000	.5509	.0668	-.2327
7.99	.6411	.0963	-.2522	0.0000	.6411	.0963	-.2522
9.93	.7126	.1308	-.2647	0.0000	.7126	.1308	-.2647
11.96	.7950	.1746	-.2874	0.0000	.7950	.1746	-.2874
13.95	.8720	.2227	-.3158	0.0000	.8720	.2227	-.3158
16.01	.9377	.2772	-.3425	0.0000	.9377	.2772	-.3425
17.95	.9630	.3292	-.3828	0.0000	.9630	.3292	-.3828
20.02	.9633	.3729	-.3987	0.0000	.9633	.3729	-.3987

TABLE III.- Continued

Wing alone: δ_N = 10°; δ_f = 10°; C_T = 0.21

RUN 87

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
[illegible]	.1656	-.1756	-.1537	.1959	.1381	.0183	-.1231
.03	.2583	-.1736	-.1794	.1961	.2347	.0195	-.1488
1.07	.3838	-.1675	-.2108	.1962	.3431	.0245	-.1799
4.12	.5198	-.1507	-.2471	.1966	.4719	.0399	-.2164
6.06	.6354	-.1251	-.2789	.1966	.5810	.0638	-.2482
7.97	.7370	-.0931	-.3063	.1966	.6713	.0939	-.2696
9.98	.8172	-.0536	-.3173	.1969	.7500	.1315	-.2865
11.99	.9116	-.0044	-.3455	.1967	.8378	.1779	-.3147
13.95	.9907	.0471	-.3733	.1967	.9183	.2269	-.3425
15.94	1.0686	.1063	-.4244	.1966	.9878	.2831	-.3737
17.98	1.1780	.1703	-.4558	.1993	1.0375	.3463	-.4247
19.93	1.1632	.2291	-.4937	.1984	1.0647	.4011	-.4626

Wing alone: δ_N = 10°; δ_f = 10°; C_T = 0.32

RUN 88

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-2.04	.1677	-.2804	-.1661	.2988	.1263	.0155	-.1194
.03	.2816	-.2752	-.1971	.2988	.2396	.0190	-.1504
2.07	.4108	-.2667	-.2283	.2989	.3483	.0256	-.1816
4.15	.5438	-.2519	-.2628	.3002	.4705	.0391	-.2159
6.02	.6546	-.2295	-.2804	.3012	.5718	.0600	-.2424
8.08	.7471	-.1940	-.3139	.3008	.6737	.0919	-.2668
9.93	.8508	-.1581	-.3297	.3018	.7480	.1256	-.2826
11.95	.9410	-.1089	-.3540	.3014	.8281	.1701	-.3069
14.01	1.0372	-.0503	-.3857	.2986	.9153	.2236	-.3389
15.90	1.1767	.0125	-.4183	.2997	.9954	.2820	-.3715
17.94	1.1638	.0778	-.4036	.2992	1.0436	.3421	-.4169
19.94	1.2381	.1465	-.5156	.2985	1.0891	.4052	-.4688

Wing alone: δ_N = 20°; δ_f = 20°; C_T = 0

RUN 93

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-2.07	.2844	.0360	-.2244	0.0000	.2844	.0360	-.2244
.05	.3891	.0438	-.2551	0.0000	.3891	.0438	-.2551
1.95	.4907	.0564	-.2863	0.0000	.4907	.0564	-.2863
4.06	.6245	.0790	-.3311	0.0000	.6245	.0790	-.3311
6.03	.7407	.1092	-.3656	0.0000	.7407	.1092	-.3656
7.94	.8107	.1420	-.3726	0.0000	.8107	.1420	-.3726
7.95	.8108	.1416	-.3728	0.0000	.8108	.1416	-.3728
9.89	.8610	.1791	-.3731	0.0000	.8610	.1791	-.3731
11.95	.9249	.2239	-.3857	0.0000	.9249	.2239	-.3857
13.96	.9871	.2736	-.4046	0.0000	.9871	.2736	-.4046
15.93	1.0386	.3277	-.4248	0.0000	1.0386	.3277	-.4248
17.95	1.0473	.3787	-.4596	0.0000	1.0473	.3787	-.4596
19.94	1.0267	.4171	-.4629	0.0000	1.0267	.4171	-.4629

Wing alone: δ_N = 20°; δ_f = 20°; C_T = 0.21

RUN 94

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.97	.3916	-.1805	-.3147	.1969	.3306	.0268	-.2941
.10	.5008	-.1498	-.3471	.1976	.4330	.0358	-.2862
2.07	.6306	-.1321	-.3886	.1979	.5563	.0513	-.3277
4.00	.7678	-.1061	-.4340	.1979	.6873	.0747	-.3731
5.97	.8868	-.0717	-.4673	.1982	.8001	.1065	-.4063
8.02	.9681	-.0304	-.4765	.1983	.8749	.1446	-.4155
9.98	1.0350	.0150	-.4855	.1986	.9358	.1870	-.4244
12.08	1.1123	.0704	-.5059	.1986	1.0067	.2387	-.4448
14.02	1.1912	.1300	-.5324	.1990	1.0799	.2949	-.4712
15.93	1.2505	.1927	-.5570	.1966	1.1351	.3519	-.4983

TABLE III.- Continued

Wing alone: $\delta_N = 20^o$; $\delta_f = 20^o$; $C_T = 0.32$

RUN 89

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.95	.4131	-.2677	-.3404	.2999	.3202	.0180	-.2480
.19	.5343	-.2533	-.3737	.2995	.4309	[illegible]	-.2815
1.99	.6638	-.2364	-.4132	.2993	.5517	.0412	-.3210
4.01	.8048	-.2088	-.4584	.3020	.6877	.0652	-.3661
6.07	.9159	-.1705	-.4951	.3000	.8041	.0990	-.4027
7.96	1.0155	-.1291	-.5050	.2992	.8759	.1352	-.4129
9.92	1.0861	-.0824	-.5126	.2996	.9366	.1772	-.4204
12.04	1.1571	-.0243	-.5334	.2999	1.0098	.2299	-.4411
13.92	1.2490	.0365	-.5598	.2999	1.0816	.2856	-.4675
15.96	1.3243	.1051	-.5885	.2996	1.1485	.3676	-.4963
17.96	1.3818	.1790	-.6376	.2992	1.1977	.4169	-.5455
20.00	1.4441	.2598	-.6925	.2996	1.2515	.4882	-.6003

Wing alone: $\delta_N = 30^o$; $\delta_f = 30^o$; $C_T = 0$

RUN 90

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.90	.3567	.0621	-.2641	0.0000	.3567	.0621	-.2641
.12	.4596	.0737	-.2967	0.0000	.4596	.0737	-.2967
2.05	[illegible]	.0902	-.3386	0.0000	.5775	.0902	-.3386
4.00	.7105	.1159	-.3834	0.0000	.7105	.1159	-.3834
5.94	.8192	.1497	-.4158	0.0000	.8192	.1497	-.4158
7.97	.8937	.1892	-.4282	0.0000	.8937	.1892	-.4282
10.10	.9695	.2346	-.4408	0.0000	.9695	.2346	-.4408
12.02	1.0220	.2793	-.4513	0.0000	1.0220	.2793	-.4513
13.95	1.0708	.3282	-.4627	0.0000	1.0708	.3282	-.4627
15.97	1.1069	.3813	-.4768	0.0000	1.1069	.3813	-.4768
17.95	1.0838	.4732	-.5001	0.0000	1.0838	.4732	-.5001

Wing alone: $\delta_N = 30^o$; $\delta_f = 30^o$; $C_T = 0.21$

RUN 91

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.96	.5465	-.1170	-.4195	.1977	.4596	.0575	-.3305
.14	.6714	-.0982	-.4599	.1989	.5715	.0728	-.3704
2.13	.8081	-.0736	-.5065	.1987	.7604	.0947	-.4171
4.14	.9450	-.0383	-.5522	.1983	.8337	.1258	-.4629
6.00	1.0481	.0020	-.5825	.1985	.9314	.1625	-.4932
8.00	1.1274	.0488	-.5925	.1987	1.0051	.2051	-.5031

Wing alone: $\delta_N = 30^o$; $\delta_f = 30^o$; $C_T = 0.32$

RUN 92

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.92	.6055	-.2158	-.4622	.3008	.4639	.0495	-.3269
.06	.7192	-.1956	-.4966	.2996	.5692	.0637	-.3616
2.04	.8587	-.1667	-.5438	.2982	.7015	.0860	-.4090
4.11	1.0016	-.1268	-.5910	.2966	.8353	.1188	-.4575
6.05	1.1230	-.0816	-.6243	.2964	.9485	.1581	-.4969
8.05	1.2041	-.0298	-.6377	.2950	1.0223	.2025	-.5050
9.95	1.2923	.0206	-.6604	.3008	1.0992	.2517	-.5250
11.93	1.3670	.0823	-.6795	.3000	1.1665	.3055	-.5445
13.99	1.4377	.1537	-.6991	.2981	1.2307	.3681	-.5650
16.07	1.5107	.2312	-.7263	.2979	1.2962	.4379	-.5923
17.88	1.5982	.3016	-.7656	.2970	1.3390	.5008	-.6319
19.94	1.6136	.3897	-.8235	.2967	1.3865	.5807	-.6900

TABLE III.- Continued

Wing canard: δ_N = Off; $\delta_f = 0^{\circ}$; $C_T = 0$

RUN 353

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-7.03	-.1171	.0248	.0049	0.0000	-.1171	.0248	.0049
.09	.0101	.0214	.0138	0.0000	.0101	.0214	.0138
1.99	.1146	.0245	.0224	0.0000	.1146	.0245	.0224
4.04	.2574	.0360	.0330	0.0000	.2574	.0360	.0330
6.08	.3945	.0573	.0396	0.0000	.3945	.0573	.0396
7.99	.5297	.0871	.0422	0.0000	.5297	.0871	.0422
10.09	.6776	.1294	.0453	0.0000	.6776	.1294	.0453
12.04	.8081	.1795	.0481	0.0000	.8081	.1795	.0481
14.07	.9476	.2381	.0497	0.0000	.9476	.2381	.0497
16.03	1.0807	.3074	.0524	0.0000	1.0807	.3074	.0524
17.97	1.1961	.3829	.0498	0.0000	1.1961	.3829	.0498
19.96	1.3231	.4737	.0489	0.0000	1.3231	.4737	.0489
21.97	1.4376	.5706	.0504	0.0000	1.4376	.5706	.0504
23.99	1.5438	.6762	.0494	0.0000	1.5438	.6762	.0494
27.44	1.7092	.8739	.0533	0.0000	1.7092	.8739	.0533

RUN 350

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.67	.8435	.1921	.0505	0.0000	.8435	.1921	.0505
13.95	.9394	.2314	.0517	0.0000	.9394	.2314	.0517
16.04	1.0894	.3073	.0543	0.0000	1.0894	.3073	.0543
18.09	1.2051	.3862	.0516	0.0000	1.2051	.3862	.0516
20.03	1.3310	.4751	.0541	0.0000	1.3310	.4751	.0541
22.04	1.4478	.5740	.0544	0.0000	1.4478	.5740	.0544
23.99	1.5465	.6751	.0520	0.0000	1.5465	.6751	.0520
26.03	1.6456	.7878	.0522	0.0000	1.6456	.7878	.0522
28.04	1.7329	.9042	.0549	0.0000	1.7329	.9042	.0549
30.00	1.7962	1.0159	.0597	0.0000	1.7962	1.0159	.0597
31.98	1.8439	1.1266	.0655	0.0000	1.8439	1.1266	.0655
33.97	1.8643	1.2311	.0691	0.0000	1.8643	1.2311	.0691
35.99	1.8607	1.3275	.0683	0.0000	1.8607	1.3275	.0683
38.00	1.8269	1.4095	.0575	0.0000	1.8269	1.4095	.0575
39.65	1.7468	1.4524	.0446	0.0000	1.7468	1.4524	.0446

Wing canard: $\delta_N = 0^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0$

RUN 390

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.96	-.1131	.0280	.0057	0.0000	-.1131	.0280	.0057
.03	.0087	.0251	.0143	0.0000	.0087	.0251	.0143
1.96	.1231	.0286	.0249	0.0000	.1231	.0286	.0249
4.08	.2637	.0401	.0325	0.0000	.2637	.0401	.0325
6.01	.3930	.0602	.0375	0.0000	.3930	.0602	.0375
8.03	.5447	.0922	.0413	0.0000	.5447	.0922	.0413
10.07	.6874	.1344	.0440	0.0000	.6874	.1344	.0440
12.02	.8139	.1840	.0477	0.0000	.8139	.1840	.0477
14.04	.9517	.2427	.0490	0.0000	.9517	.2427	.0490
16.02	1.0795	.3118	.0525	0.0000	1.0795	.3118	.0525
18.01	1.2128	.3936	.0523	0.0000	1.2128	.3936	.0523
20.00	1.3268	.4801	.0528	0.0000	1.3268	.4801	.0528

RUN 334

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.70	.8593	.1986	.0451	0.0000	.8593	.1986	.0451
14.02	.9538	.2412	.0463	0.0000	.9538	.2412	.0463
16.07	1.0860	.3134	.0480	0.0000	1.0860	.3134	.0480
18.03	1.2115	.3929	.0484	0.0000	1.2115	.3929	.0484
20.07	1.3333	.4836	.0495	0.0000	1.3333	.4836	.0495
21.97	1.4429	.5776	.0507	0.0000	1.4429	.5776	.0507
23.95	1.5465	.6799	.0529	0.0000	1.5465	.6799	.0529
26.04	1.6948	.7985	.0537	0.0000	1.6948	.7985	.0537
28.04	1.7403	.9139	.0550	0.0000	1.7403	.9139	.0550
29.96	1.7995	1.0229	.0564	0.0000	1.7995	1.0229	.0564
31.98	1.8452	1.1344	.0620	0.0000	1.8452	1.1344	.0620
34.11	1.8687	1.2474	.0663	0.0000	1.8687	1.2474	.0663
36.09	1.8652	1.3432	.0615	0.0000	1.8652	1.3432	.0615
37.94	1.8362	1.4201	.0470	0.0000	1.8362	1.4201	.0470
40.00	1.7562	1.4707	.0305	0.0000	1.7562	1.4707	.0305

TABLE III.- Continued

Wing canard: $\delta_N = 0^o$; $\delta_f = 0^o$; $C_T = 0.20$

RUN 391

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-2.00	-.1128	-.1726	.0061	.1977	[illegible]	.0250	.0061
.05	.0088	-.1760	.0135	.1987	.0084	.0227	.0135
2.04	.1346	-.1717	.0229	.1988	.1276	.0281	.0229
4.17	.2819	-.1988	.0315	.1984	.2675	.0381	.0315
5.99	.4203	-.1392	.0364	.1984	.3996	.0581	.0364
8.05	.5810	-.1049	.0377	.1970	.5534	.0802	.0377
10.04	.7252	-.0636	.0400	.1968	.6908	.1308	.0400
12.04	.8635	-.0119	.0431	.1970	.8274	.1807	.0431
14.04	1.0093	.0494	.0442	.1970	.9615	.2405	.0442
16.11	1.1984	.1256	.0463	.1972	1.1017	.3150	.0463
18.01	1.2921	.2069	.0438	.1977	1.2310	.3949	.0438
19.95	1.4153	.2960	.0400	.1979	1.3477	.4826	.0400

RUN 335

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.01	.9237	.0129	.0325	.1968	.8805	.2028	.0325
14.04	1.0263	.0532	.0324	.1980	.9782	.2452	.0324
16.04	1.1946	.1256	.0321	.1971	1.1081	.3144	.0321
18.10	1.3042	.2153	.0285	.1963	1.2433	.4018	.0285
20.09	1.4351	.3092	.0284	.1966	1.3676	.4938	.0284
22.03	1.5551	.4083	.0255	.1968	1.4812	.5908	.0255
24.03	1.6744	.5204	.0229	.1968	1.5943	.7001	.0229
26.09	1.7866	.6428	.0238	.1960	1.7004	.8186	.0238
28.08	1.8798	.7640	.0238	.1966	1.7874	.9374	.0238
29.98	1.9605	.8831	.0223	.1973	1.8620	1.0540	.0223
32.00	2.0255	1.0107	.0234	.1971	1.9210	1.1779	.0234
33.96	2.0585	1.1255	.0207	.1964	1.9488	1.2884	.0207
35.95	2.0773	1.2390	.0146	.1966	1.9619	1.3981	.0146
37.92	2.0845	1.3508	.0015	.1967	1.9636	1.5060	.0015
39.99	2.0680	1.4536	-.0292	.1970	1.9394	1.6043	-.0292

Wing canard: $\delta_N = 0^o$; $\delta_f = 0^o$; $C_T = 0.30$

RUN 392

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.98	-.1051	-.2710	.0044	.2990	-.0949	.0279	.0044
-.02	.0114	-.2733	.0137	.2992	.0115	.0260	.0137
2.11	.1433	-.2679	.0235	.2991	.1379	.0310	.0235
4.01	.2785	-.2566	.0318	.2990	.2576	.0416	.0318
6.08	.4376	-.2334	.0363	.2996	.4058	.0645	.0363
7.96	.5849	-.2028	.0385	.2997	.5434	.0939	.0385
10.02	.7351	-.1603	.0382	.3003	.6829	.1353	.0382
11.97	.8827	-.1073	.0415	.3003	.8274	.1865	.0415
14.06	1.0344	-.0406	.0395	.3002	.9619	.2507	.0395
16.10	1.1942	.0389	.0423	.2988	1.1013	.3260	.0423
18.03	1.3282	.1208	.0417	.2990	1.2356	.4050	.0417
20.04	1.4584	.2109	.0442	.2993	1.3598	.4921	.0442

RUN 336

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.08	.9281	-.0921	.0319	.2988	.8638	.1995	.0319
13.96	1.0401	-.0461	.0305	.2995	.9679	.2446	.0305
16.14	1.1986	.0369	.0311	.2999	1.1152	.3249	.0311
18.05	1.3324	.1177	.0298	.2985	1.2399	.4015	.0298
20.01	1.4726	.2124	.0312	.2992	1.3702	.4935	.0312
22.06	1.5948	.3155	.0280	.2994	1.4873	.5930	.0280
23.93	1.7164	.4237	.0253	.2989	1.5952	.6969	.0253
25.92	1.8337	.5448	.0252	.2991	1.7030	.8138	.0252
27.96	1.9355	.6729	.0249	.2981	1.7957	.9363	.0249
30.09	2.0231	.8075	.0231	.2986	1.8734	1.0658	.0231
32.03	2.0878	.9325	.0212	.2982	1.9296	1.1853	.0212
34.07	2.1282	1.0563	.0167	.2988	1.9608	1.3038	.0167
35.93	2.1528	1.1684	.0105	.2983	1.9778	1.4099	.0105
38.00	2.1627	1.2900	-.0037	.2979	1.9783	1.5246	-.0037
39.98	2.1676	1.4067	-.0322	.2977	1.9764	1.6348	-.0322

TABLE III.- Continued

Wing canard: $\delta_N = 10^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0$

RUN 347

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.99	-.0389	.0265	-.0404	0.0000	-.0389	.0265	-.0404
.10	.0843	.0276	-.0307	0.0000	.0843	.0276	-.0307
2.01	.1939	.0331	-.0226	0.0000	.1939	.0331	-.0226
4.08	.3244	.0448	-.0148	0.0000	.3244	.0448	-.0148
5.99	.4947	.0690	-.0098	0.0000	.4947	.0690	-.0098
8.01	.6070	.1029	-.0062	0.0000	.6070	.1029	-.0062
10.08	.7461	.1468	-.0023	0.0000	.7461	.1468	-.0023
12.03	.8856	.1979	.0030	0.0000	.8856	.1979	.0030
14.04	1.0193	.2606	.0014	0.0000	1.0193	.2606	.0014
16.06	1.1519	.3365	.0048	0.0000	1.1519	.3365	.0048
17.90	1.2667	.4124	.0048	0.0000	1.2667	.4124	.0048
19.99	1.3867	.5050	.0091	0.0000	1.3867	.5050	.0091

RUN 341

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
11.88	.9176	.2149	.0044	0.0000	.9176	.2149	.0044
13.92	1.0080	.2570	.0022	0.0000	1.0080	.2570	.0022
16.18	1.1605	.3416	.0046	0.0000	1.1605	.3416	.0046
18.00	1.2746	.4180	.0025	0.0000	1.2746	.4180	.0025
20.04	1.3949	.5111	.0046	0.0000	1.3949	.5111	.0046
22.07	1.5022	.6102	.0031	0.0000	1.5022	.6102	.0031
23.99	1.6090	.7121	.0091	0.0000	1.6090	.7121	.0091
26.12	1.7093	.8295	.0168	0.0000	1.7093	.8295	.0168
28.07	1.7720	.9389	.0244	0.0000	1.7720	.9389	.0244
29.88	1.8349	1.0515	.0293	0.0000	1.8349	1.0515	.0293
31.96	1.8833	1.1657	.0379	0.0000	1.8833	1.1657	.0379
33.92	1.8987	1.2677	.0429	0.0000	1.8987	1.2677	.0429
35.93	1.8977	1.3665	.0449	0.0000	1.8977	1.3665	.0449
37.98	1.8648	1.4526	.0329	0.0000	1.8648	1.4526	.0329
39.80	1.7904	1.4959	.0183	0.0000	1.7904	1.4959	.0183

Wing canard: $\delta_N \approx 10^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0.20$

RUN 388

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.89	-.0055	-.1757	-.0725	.1984	-.0355	.0712	-.0415
.04	.1164	-.1767	-.0663	.1986	.0717	.0209	-.0353
1.93	.2387	-.1682	-.0589	.1989	.1979	.0263	-.0279
4.01	.3496	-.1524	-.0531	.1990	.3414	.0405	-.0220
6.02	.5367	-.1262	-.0497	.1992	.4707	.0648	-.0186
7.99	.6980	-.0905	-.0493	.1987	.6266	.0985	-.0183
10.07	.8378	-.0458	-.0430	.1985	.7697	.1407	-.0119
12.00	.9868	.0118	-.0467	.1978	.9107	.1952	-.0138
14.03	1.1349	.0916	-.0515	.1988	1.0536	.2632	-.0204
16.01	1.2716	.1608	-.0529	.1987	1.1844	.3393	-.0218
18.07	1.4171	.2561	-.0595	.1980	1.3239	.4308	-.0286
20.07	1.5546	.3571	-.0652	.1984	1.4552	.5288	-.0342

RUN 342

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.75	1.0429	.0470	-.0585	.1955	.9669	.2273	-.0279
13.91	1.1308	.0889	-.0608	.1949	1.0518	.2671	-.0306
16.06	1.2788	.1707	-.0619	.1966	1.1903	.3473	-.0312
17.99	1.4152	.2587	-.0674	.1974	1.3276	.4331	-.0365
20.02	1.5583	.3638	-.0703	.1973	1.4596	.5346	-.0395
22.11	1.6823	.4744	-.0758	.1976	1.5772	.6418	-.0449
24.14	1.8177	.5987	-.0796	.1969	1.7027	.7617	-.0488
25.97	1.9137	.7138	-.0809	.1969	1.7981	.8732	-.0501
27.99	2.0189	.8487	-.0822	.1968	1.8978	1.0038	-.0514
30.06	2.0964	.9815	-.0813	.1967	1.9699	1.1321	-.0506
32.02	2.1535	1.1090	-.0820	.1968	2.0218	1.2552	-.0513
33.97	2.1469	1.2300	-.0823	.1963	2.0306	1.3713	-.0517
35.93	2.1966	1.3439	-.0877	.1962	2.0556	1.4804	-.0570
37.91	2.2056	1.4628	-.0960	.1965	2.0598	1.5944	-.0653
40.00	2.1906	1.5763	-.1208	.1965	2.0401	1.7026	-.0901

TABLE III.- Continued

Wing canard: $\delta_N = 10^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0.30$

RUN 309

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
-1.96	.0102	-.2764	-.0895	.3016	-.0371	.0225	-.0424
.08	.1352	-.2738	-.0879	.3013	.0876	.0229	-.0358
2.06	.2640	-.2655	-.0763	.3016	.2010	.0296	-.0291
4.01	.3972	-.2496	-.0727	.3015	.3247	.0432	-.0256
6.02	.5535	-.2224	-.0695	.3016	.4703	.0674	-.0224
7.99	.7106	-.1836	-.0693	.3002	.6179	.1019	-.0223
9.96	.8623	-.1365	-.0680	.2999	.7600	.1454	-.0211
12.00	1.0135	-.0759	-.0705	.3000	.9011	.2023	-.0236
14.00	1.1672	-.0086	-.0714	.3004	1.0451	.2661	-.0245
15.99	1.3093	.0688	-.0698	.3006	1.1777	.3389	-.0229
17.97	1.4596	.1615	-.0758	.3005	1.3188	.4270	-.0288
19.87	1.5976	.2650	-.0805	.2995	1.4477	.5245	-.0337

RUN 343

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
12.59	1.0701	-.0368	-.0704	.2993	.9552	.2196	-.0236
14.09	1.1930	-.0036	-.0726	.2988	1.0607	.2707	-.0257
16.07	1.3737	.0800	-.0755	.2977	1.1970	.3474	-.0289
17.91	1.4588	.1664	-.0799	.2979	1.3196	.4296	-.0334
20.16	1.6181	.2825	-.0847	.2985	1.4481	.5406	-.0381
22.05	1.7431	.3899	-.0906	.2988	1.5850	.6426	-.0441
24.08	1.8711	.5150	-.0985	.2975	1.7044	.7614	-.0520
26.03	1.9887	.6418	-.0996	.2977	1.8115	.8826	-.0530
28.02	2.0886	.7762	-.1035	.2981	1.9050	1.0091	-.0569
29.97	2.1753	.9095	-.1063	.2972	1.9844	1.1372	-.0599
32.03	2.2458	1.0456	-.1091	.3016	2.0440	1.2696	-.0619
34.00	2.2889	1.1781	-.1126	.3006	2.0800	1.3944	-.0656
35.99	2.3063	1.3041	-.1239	.2996	2.0908	1.5123	-.0771
37.96	2.3141	1.4242	-.1298	.2999	2.0914	1.6250	-.0819
39.97	2.3196	1.5536	-.1524	.2986	2.0899	1.7457	-.1058

Wing canard: $\delta_N = 30^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0$

RUN 304

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
-1.98	.0550	.0425	-.0958	0.0000	.0550	.0425	-.0958
.08	.1686	.0446	-.0855	0.0000	.1686	.0446	-.0855
2.05	.2999	.0525	-.0767	0.0000	.2999	.0525	-.0767
4.07	.4184	.0683	-.0688	0.0000	.4184	.0683	-.0688
6.01	.5467	.0919	-.0581	0.0000	.5467	.0919	-.0581
8.02	.6869	.1249	-.0500	0.0000	.6869	.1249	-.0500
9.96	.8183	.1686	-.0441	0.0000	.8183	.1686	-.0441
12.00	.9568	.2268	-.0446	0.0000	.9568	.2268	-.0446
14.06	1.0957	.2963	-.0479	0.0000	1.0957	.2963	-.0479
16.04	1.2277	.3747	-.0457	0.0000	1.2277	.3747	-.0457
18.00	1.3460	.4575	-.0431	0.0000	1.3460	.4575	-.0431
19.97	1.4572	.5475	-.0363	0.0000	1.4572	.5475	-.0363
22.02	1.5659	.6492	-.0326	0.0000	1.5659	.6492	-.0326
24.09	1.6775	.7637	-.0291	0.0000	1.6775	.7637	-.0291
25.95	1.7504	.8642	-.0250	0.0000	1.7504	.8642	-.0250

RUN 337

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
12.62	1.0037	.2465	-.0448	0.0000	1.0037	.2465	-.0448
14.03	1.0915	.2934	-.0454	0.0000	1.0915	.2934	-.0454
15.96	1.2169	.3683	-.0426	0.0000	1.2169	.3683	-.0426
18.02	1.3418	.4560	-.0431	0.0000	1.3418	.4560	-.0431
19.93	1.4580	.5467	-.0372	0.0000	1.4580	.5467	-.0372
21.96	1.5690	.6492	-.0384	0.0000	1.5690	.6492	-.0384
24.06	1.6737	.7624	-.0347	0.0000	1.6737	.7624	-.0347
26.08	1.7663	.8779	-.0225	0.0000	1.7663	.8779	-.0225
28.01	1.8288	.9860	-.0157	0.0000	1.8288	.9860	-.0157
29.94	1.8872	1.0971	-.0048	0.0000	1.8872	1.0971	-.0048
31.91	1.9160	1.2017	.0082	0.0000	1.9160	1.2017	.0082
33.92	1.9238	1.3026	.0171	0.0000	1.9238	1.3026	.0171
35.94	1.9067	1.3918	.0232	0.0000	1.9067	1.3918	.0232
38.03	1.8505	1.4620	.0100	0.0000	1.8505	1.4620	.0100
39.95	1.7630	1.4865	.0122	0.0000	1.7630	1.4865	.0122

Wing canard: $\delta_N = 30^o$; $\delta_f = 0^o$; $C_T = 0.20$

RUN 337

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-2.03	.2224	-.1395	-.2219	.1962	.1304	.0378	-.1336
-.01	.3997	-.1294	-.2144	.1970	.2419	.0413	-.1257
1.97	.4631	-.1188	-.2071	.1973	.3587	.0485	-.1183
4.01	.6702	-.0946	-.2015	.1969	.5100	.0606	-.1129
6.10	.7695	-.0597	-.2001	.1970	.6574	.1000	-.1115
8.04	.9200	-.0139	-.2011	.1968	.7987	.1411	-.1126
9.96	1.0596	.0397	-.2022	.1971	.9371	.1908	-.1135
12.09	1.2173	.1134	-.2076	.1967	1.0854	.2593	-.1189
13.98	1.3943	.1969	-.2140	.1970	1.2176	.3287	-.1254
16.00	1.4965	.2776	-.2198	.1971	1.3567	.4145	-.1311
18.09	1.6448	.3834	-.2264	.1971	1.4991	.5150	-.1377
20.08	1.7756	.4930	-.2295	.1963	1.6292	.6189	-.1402
21.96	1.8705	.5958	-.2331	.1973	1.7232	.7173	-.1443
24.04	2.0098	.7325	-.2422	.1968	1.8505	.8440	-.1537
25.96	2.1134	.8611	-.2465	.1971	1.9556	.9714	-.1579

RUN 339

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.66	1.2822	.1370	-.2191	.1965	1.1291	.2815	-.1306
13.93	1.3496	.1954	-.2208	.1970	1.2179	.3273	-.1323
16.02	1.4956	.2777	-.2253	.1967	1.3541	.4143	-.1368
18.08	1.6377	.3802	-.2322	.1971	1.4921	.5119	-.1435
20.06	1.7680	.4991	-.2333	.1964	1.6174	.6151	-.1449
22.02	1.8986	.6040	-.2396	.1964	1.7398	.7249	-.1512
24.07	2.0156	.7369	-.2431	.1956	1.8571	.8517	-.1551
25.96	2.1171	.8604	-.2426	.1958	1.9498	.9700	-.1545
28.08	2.2123	1.0063	-.2424	.1965	2.0455	1.1102	-.1540
29.99	2.2772	1.1350	-.2410	.1968	2.1068	1.2334	-.1525
32.04	2.3143	1.2669	-.2395	.1957	2.1414	1.3587	-.1514
33.94	2.3371	1.3882	-.2355	.1961	2.1608	1.4726	-.1473
36.08	2.3446	1.5165	-.2348	.1961	2.1654	1.5960	-.1465
37.95	2.3460	1.6329	-.2455	.1973	2.1640	1.7069	-.1567
39.86	2.3370	1.7472	-.2602	.1577	2.1573	1.8152	-.1713

Wing canard: $\delta_N = 30^o$; $\delta_f = 0^o$; $C_T = 0.30$

RUN 338

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.96	.2680	-.2323	-.2623	.2985	.1295	.0312	-.1280
-.03	.3971	-.2224	-.2560	.2987	.2385	.0373	-.1212
1.98	.5256	-.2035	-.2511	.2995	.3670	.0485	-.1163
3.98	.6777	-.1831	-.2466	.2996	.5107	.0653	-.1098
5.98	.8298	-.1470	-.2432	.3002	.6534	.0960	-.1081
8.08	.9886	-.0963	-.2415	.2990	.8047	.1391	-.1070
10.03	1.1366	-.0390	-.2429	.2992	.9470	.1901	-.1082
12.00	1.2822	.0296	-.2483	.2997	1.0817	.2523	-.1134
13.96	1.4305	.1100	-.2554	.2997	1.2275	.3257	-.1206
16.08	1.5806	.2098	-.2615	.2981	1.3697	.4164	-.1276
18.05	1.7295	.3146	-.2683	.2979	1.5070	.5137	-.1343
20.02	1.8686	.4276	-.2763	.2982	1.6391	.6192	-.1401
22.00	1.9867	.5479	-.2808	.2991	1.7590	.7321	-.1462
23.99	2.1164	.6755	-.2869	.2983	1.8691	.8508	-.1526
25.97	2.2732	.8119	-.2934	.2996	1.9791	.9796	-.1607

RUN 340

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.51	1.3293	.0478	-.2603	.3001	1.1209	.2690	-.1253
13.96	1.4315	.1080	-.2654	.3003	1.2231	.3241	-.1303
16.09	1.5927	.2059	-.2710	.3008	1.3660	.4146	-.1356
17.95	1.7132	.3020	-.2770	.3010	1.4897	.5036	-.1415
19.97	1.8480	.4177	-.2786	.2988	1.6201	.6099	-.1442
22.03	1.9834	.5444	-.2869	.2990	1.7477	.7283	-.1524
24.09	2.1053	.6743	-.2918	.2995	1.8628	.8502	-.1570
25.95	2.2092	.8041	-.2939	.2997	1.9609	.9719	-.1591
28.04	2.3126	.9533	-.2959	.2996	2.0597	1.1119	-.1611
29.95	[illegible]	1.0923	-.2980	.2993	2.1299	1.2422	-.1633
32.08	2.4401	1.2371	-.2987	.3003	2.1747	1.3779	-.1636
34.09	2.4630	1.3712	-.2948	.2982	2.1993	1.5013	-.1606
36.07	2.4683	1.4917	-.2964	.2994	2.1948	1.6133	-.1617
37.92	2.4770	1.6196	-.3058	.2989	2.2010	1.7319	-.1713
39.96	2.4705	1.7568	-.3226	.2992	2.1984	1.8574	-.1879

TABLE III.- Continued

Wing canard: $\delta_N = 10^{\circ}$; $\delta_f = 10^{\circ}$; $C_T = 0$

RUN 394

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.98	.1179	.0267	-.1393	0.0000	.1179	.0267	-.1393
-.03	.2222	.0305	-.1290	0.0000	.2277	.0305	-.1290
2.00	.3450	.0406	-.1207	0.0000	.3450	.0406	-.1207
4.01	.4797	.0580	-.1171	0.0000	.4797	.0580	-.1171
6.03	.6214	.0841	-.1024	0.0000	.6214	.0841	-.1024
8.01	.7604	.1213	-.0969	0.0000	.7604	.1213	-.0969
10.06	.8900	.1703	-.0885	0.0000	.8900	.1703	-.0885
11.99	1.0155	.2273	-.0826	0.0000	1.0155	.2273	-.0826
13.98	1.1401	.2931	-.0840	0.0000	1.1401	.2931	-.0840
15.97	1.2728	.3729	-.0784	0.0000	1.2728	.3729	-.0784
17.93	1.3950	.4552	-.0760	0.0000	1.3950	.4552	-.0760
20.01	1.5160	.5578	-.0721	0.0000	1.5160	.5578	-.0721

RUN 344

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.01	1.0512	.2476	-.0862	0.0000	1.0512	.2476	-.0862
14.12	1.1603	.3025	-.0856	0.0000	1.1603	.3025	-.0856
16.02	1.2760	.3766	-.0797	0.0000	1.2760	.3766	-.0797
18.06	1.4018	.4664	-.0771	0.0000	1.4018	.4664	-.0771
19.98	1.5211	.5601	-.0709	0.0000	1.5211	.5601	-.0709
22.01	1.6285	.6642	-.0678	0.0000	1.6285	.6642	-.0678
23.89	1.7765	.7690	-.0649	0.0000	1.7765	.7690	-.0649
26.03	1.8134	.8894	-.0568	0.0000	1.8134	.8894	-.0568
28.07	1.8832	1.0083	-.0472	0.0000	1.8832	1.0083	-.0472
29.92	1.9293	1.1125	-.0347	0.0000	1.9293	1.1125	-.0347
31.96	1.9529	1.2206	-.0225	0.0000	1.9529	1.2206	-.0225
33.96	1.9547	1.3203	-.0143	0.0000	1.9547	1.3203	-.0143
35.93	1.9364	1.4098	-.0137	0.0000	1.9364	1.4098	-.0137
37.94	1.8693	1.4731	-.0295	0.0000	1.8693	1.4731	-.0295
39.89	1.7776	1.5091	-.0299	0.0000	1.7776	1.5091	-.0299

Wing canard: $\delta_N = 10^{\circ}$; $\delta_f = 10^{\circ}$; $C_T = 0.20$

RUN 395

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.88	.1659	-.1733	-.1723	.1968	.1391	.0216	-.1416
-.02	.2740	-.1698	-.1627	.1975	.2404	.0247	-.1318
2.03	.4016	-.1589	-.1577	.1975	.3604	.0343	-.1269
4.07	.5536	-.1401	-.1516	.1980	.5073	.0519	-.1207
6.05	.7015	-.1095	-.1480	.1982	.6467	.0810	-.1171
8.11	.8611	.0657	-.1446	.1986	.7994	.1231	-.1136
10.10	.9978	-.0137	-.1382	.1985	[illegible]	.1728	-.1072
12.05	1.1401	.0497	-.1384	.1991	1.0653	.2343	-.1073
14.07	1.2820	.1255	-.1435	.1988	1.2009	.3070	-.1124
15.99	1.4082	.2057	-.1405	.1990	1.3210	.3846	-.1094
18.01	1.5508	.3036	-.1447	.1992	1.4572	.4795	-.1136
20.05	1.6776	.4078	-.1473	.1999	1.5775	.5808	-.1161

RUN 345

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.78	1.1904	.0797	-.1522	.1969	1.1144	.2614	-.1215
14.11	1.2916	.1332	-.1535	.1975	1.2111	.3135	-.1226
16.09	1.4258	.2177	-.1496	.1972	1.3391	.3969	-.1188
18.17	1.5675	.3186	-.1524	.1965	1.4766	.4918	-.1217
20.04	1.6923	.4182	-.1518	.1968	1.5938	.5986	-.1211
21.92	1.8077	.5248	-.1533	.1967	1.7037	.6918	-.1225
24.02	1.9267	.6529	-.1562	.1963	1.8169	.8154	-.1255
25.88	2.0252	.7722	-.1598	.1965	1.9101	.9315	-.1291
27.92	2.1142	.9053	-.1571	.1969	1.9992	1.0606	-.1263
29.98	2.1690	1.0410	-.1514	.1961	2.0590	1.1913	-.1207
32.08	2.2287	1.1711	-.1456	.1967	2.0969	1.3171	-.1147
34.00	2.2453	1.2855	-.1412	.1957	2.1094	1.4263	-.1108
35.99	2.2506	1.4002	-.1423	.1961	2.1096	1.5344	-.1118
38.01	2.2474	1.5184	-.1566	.1959	2.1018	1.6695	-.1258
39.96	2.2186	1.6150	-.1733	.1965	2.0681	1.7614	-.1426

TABLE III.- Continued

Wing canard: $\delta_N = 10^\circ$; $\delta_f = 10^\circ$; $C_T = 0.30$

RUN 345

ALPHA	CL	CD	CM	CT	CLF	CDE	CME
-1.89	.1776	-.2721	-.1882	.2975	.1356	.0224	-.1417
.09	.2917	-.2677	-.1799	.2998	.2392	.0275	-.1330
1.98	.4295	-.2548	-.1751	.2996	.3633	.0382	-.1283
4.11	.5915	-.2327	-.1709	.2998	.5094	.0580	-.1241
5.98	.7294	-.2035	-.1664	.3002	.6427	.0851	-.1195
7.98	.8960	-.1609	-.1642	.3005	.7918	.1250	-.1172
10.09	1.0305	-.1077	-.1554	.3009	.9272	.1749	-.1084
12.04	1.1756	-.0452	-.1525	.3011	1.0674	.2339	-.1054
14.02	1.3233	.0289	-.1549	.3018	1.2005	.3045	-.1077
16.04	1.4649	.1216	-.1573	.2977	1.3342	.3891	-.1058
17.99	1.5960	.2149	-.1571	.2981	1.4561	.4787	-.1105
19.97	1.7329	.3217	-.1610	.2985	1.5838	.5803	-.1144

RUN 346

ALPHA	CL	CD	CM	CT	CLF	CDE	CME
12.55	1.2259	-.0202	-.1637	.2972	1.1118	.2543	-.1172
13.93	1.3242	.0327	-.1657	.2979	1.2034	.3044	-.1191
16.18	1.4759	.1283	-.1623	.2984	1.3443	.3961	-.1154
18.09	1.6161	.2251	-.1659	.2982	1.4757	.4881	-.1192
20.07	1.7498	.3329	-.1680	.2979	1.6006	.5906	-.1214
22.04	1.8808	.4497	-.1704	.2980	1.7275	.7023	-.1239
23.98	1.9976	.5706	-.1764	.2981	1.8311	.8178	-.1298
25.98	2.1028	.7039	-.1809	.2971	1.9283	.9443	-.1344
27.96	2.1951	.8360	-.1791	.2980	2.0119	1.0710	-.1329
29.94	2.2707	.9710	-.1783	.2985	2.0791	1.1999	-.1317
31.92	2.3211	1.1045	-.1752	.2971	2.1276	1.3256	-.1287
33.98	2.3487	1.2308	-.1719	.2990	2.1411	1.4460	-.1252
35.83	2.3556	1.3438	-.1721	.2987	2.1417	1.5519	-.1256
38.03	2.3702	1.4981	-.1885	.2988	2.1681	1.6879	-.1418
39.90	2.3996	1.5987	-.2110	.2987	2.1309	1.7921	-.1643

Wing canard: $\delta_N = 30^\circ$; $\delta_f = 30^\circ$; $C_T = 0$

RUN 391

ALPHA	CL	CD	CM	CT	CLF	CDE	CME
-2.02	.3619	.0678	-.2914	0.0000	.3619	.0678	-.2914
.01	.4941	.0795	-.2893	0.0000	.4941	.0795	-.2893
2.08	.5990	.0984	-.2825	0.0000	.5990	.0984	-.2825
4.11	.7391	.1255	-.2720	0.0000	.7391	.1255	-.2720
6.08	.8721	.1617	-.2641	0.0000	.8721	.1617	-.2641
8.01	1.0017	.2080	-.2535	0.0000	1.0017	.2080	-.2535
10.13	1.1251	.2736	-.2432	0.0000	1.1251	.2736	-.2432
11.96	1.2497	.3301	-.2473	0.0000	1.2497	.3301	-.2473
13.98	1.3817	.4178	-.2466	0.0000	1.3817	.4178	-.2466
16.09	1.4940	.5048	-.2338	0.0000	1.4940	.5048	-.2338
18.08	1.6056	.5969	-.2233	0.0000	1.6056	.5969	-.2233
20.08	1.7078	.6968	-.2072	0.0000	1.7078	.6968	-.2072
21.96	1.7832	.7909	-.1927	0.0000	1.7832	.7909	-.1927
24.00	1.8692	.9064	-.1833	0.0000	1.8692	.9064	-.1833
26.05	1.9363	1.0213	-.1687	0.0000	1.9363	1.0213	-.1687

RUN 347

ALPHA	CL	CD	CM	CT	CLF	CDE	CME
12.53	1.2759	.3551	-.2396	0.0000	1.2759	.3551	-.2396
14.00	1.3645	.4130	-.2361	0.0000	1.3645	.4130	-.2361
16.08	1.4966	.5050	-.2289	0.0000	1.4966	.5050	-.2289
18.13	1.5991	.5964	-.2186	0.0000	1.5991	.5964	-.2186
19.97	1.6996	.6918	-.2047	0.0000	1.6996	.6918	-.2047
22.10	1.7988	.8063	-.1920	0.0000	1.7988	.8063	-.1920
23.96	1.8636	.9053	-.1834	0.0000	1.8636	.9053	-.1834
26.00	1.9390	1.0266	-.1681	0.0000	1.9390	1.0266	-.1681
27.97	1.9836	1.1335	-.1526	0.0000	1.9836	1.1335	-.1526
30.02	2.0150	1.2453	-.1332	0.0000	2.0150	1.2453	-.1332
31.98	2.0168	1.3612	-.1121	0.0000	2.0168	1.3612	-.1121
34.07	1.9987	1.4317	-.1028	0.0000	1.9987	1.4317	-.1028
35.91	1.9107	1.4776	-.1085	0.0000	1.9107	1.4776	-.1085
37.98	1.8151	1.5164	-.0963	0.0000	1.8151	1.5164	-.0963
39.88	1.7382	1.5568	-.0849	0.0000	1.7382	1.5568	-.0849

TABLE III.- Continued

Wing canard: $\delta_N = 30^{\circ}$; $\delta_f = 30^{\circ}$; $C_T = 0.20$

RUN 382

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.85	.5464	-.1117	-.4333	.1980	.4579	.0634	-.3442
.04	.6761	-.0933	-.4384	.1988	.5745	.0798	-.3489
2.04	.8312	-.0664	-.4489	.1982	.7261	.1015	-.3497
4.04	.9727	-.0300	-.4391	.1983	.8617	.1344	-.3488
6.12	1.1341	.0200	-.4344	.1987	1.0178	.1807	-.3492
8.01	1.2499	.0746	-.4268	.1979	1.1280	.2505	-.3377
10.08	1.3903	.1470	-.4181	.1981	1.2579	.2985	-.3278
11.96	1.5232	.2778	-.4258	.1978	1.3910	.3745	-.3348
13.96	1.6678	.3219	-.4345	.1979	1.5384	.4644	-.3456
15.98	1.8170	.4276	-.4389	.1977	1.6748	.5650	-.3409
18.12	1.9326	.5377	-.4346	.1979	1.7893	.6698	-.3456
20.14	2.0587	.6968	-.4266	.1976	1.8997	.7934	-.3378
22.05	2.1522	.7752	-.4239	.1979	1.9962	.8909	-.3349
24.09	2.2482	.9090	-.4248	.1978	2.0890	1.0256	-.3357
25.95	1.3299	1.6382	-.4291	.1970	2.1667	1.1484	-.3344

RUN 348

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.94	1.5565	.2520	-.4313	.1980	1.4224	.3979	-.3422
13.99	1.6579	.3716	-.4357	.1970	1.5211	.4634	-.3478
16.05	1.8059	.4777	-.4391	.1973	1.6658	.5647	-.3503
18.00	1.9294	.5423	-.4325	.1974	1.7767	.6641	-.3437
19.96	2.0319	.6451	-.4267	.1970	1.8809	.7719	-.3381
21.98	2.1334	.7679	-.4222	.1972	1.9691	.8902	-.3339
23.99	2.[illegible]	.8808	-.4219	.2004	2.0704	1.0196	-.3317
25.99	2.3[illegible]7	1.0376	-.4189	.1991	2.1598	1.1407	-.3293
28.07	2.3990	1.1805	-.4130	.1995	2.2306	1.2967	-.3232
30.10	2.4524	1.3270	-.4025	.2000	2.2790	1.4217	-.3129
31.94	2.4506	1.4326	-.3885	.1991	2.2879	1.5260	-.2989
34.07	2.4583	1.5592	-.3764	.1995	2.2704	1.6[illegible]	-.2866
35.97	2.4552	1.6759	-.3754	.1989	2.2716	1.7569	-.2858
37.91	2.4292	1.7855	-.3838	.1987	2.2452	1.9603	-.2944

Wing canard: δ_N 30°; $\delta_f = 30^{\circ}$; $C_T = 0.30$

RUN 383

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.89	.6097	-.2061	-.4812	.2999	.4694	.0584	-.3462
.02	.7366	-.1855	-.4845	.3005	.5843	.0747	-.3492
2.07	.8961	-.1551	-.4900	.3012	.7362	.1002	-.3544
4.00	1.0473	-.1171	-.4908	.3012	.8790	.1326	-.3538
6.14	1.2101	-.0621	-.4906	.3009	1.0326	.1908	-.3550
8.02	1.3271	-.0042	-.4775	.2993	1.1477	.2316	-.3428
9.99	1.4436	.0686	-.4729	.2999	1.2709	.2986	-.3379
12.12	1.6241	.1607	-.4767	.3011	1.4277	.3835	-.3412
14.01	1.7585	.2532	-.4883	.2998	1.5427	.4689	-.3533
16.08	1.9123	.3671	-.4975	.2997	1.6904	.5750	-.3626
18.02	2.0490	.4799	-.4971	.2997	1.8262	.6803	-.3622
19.97	2.1993	.5950	-.4826	.3005	1.9292	.7891	-.3572
21.96	2.2613	.7217	-.4888	.2999	2.0251	.9065	-.3538
23.93	2.3675	.8378	-.4857	.2997	2.1292	1.0[illegible]3	-.3500
26.01	2.4520	1.0020	-.4944	.2995	2.2037	1.1[illegible]2	-.3497

RUN 349

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.43	1.6629	.1761	-.4847	.2992	1.4419	.3969	-.3561
14.07	1.7600	.2359	-.4880	.2993	1.5519	.4720	-.3561
15.96	1.8921	.3582	-.4912	.2981	1.6770	.5654	-.3570
18.05	2.0350	.4783	-.4932	.2985	1.8199	.6779	-.3589
20.04	2.1467	.5969	-.4876	.2981	1.9187	.7883	-.3533
22.03	2.2560	.7248	-.4818	.2981	2.0209	.9082	-.3477
23.91	2.3504	.8518	-.4806	.2986	2.1091	1.0277	-.3463
25.96	2.4471	1.0003	-.4790	.2977	2.2004	1.1670	-.3458
27.95	2.5170	1.1415	-.4762	.2993	2.2647	1.3023	-.3415
30.00	2.5756	1.2896	-.4687	.2992	2.3163	1.4393	-.3340
31.98	2.5967	1.4192	-.4569	.3002	2.3317	1.5602	-.3210
33.98	2.5973	1.5456	-.4468	.2993	2.3284	1.6760	-.3121
35.94	2.5859	1.6662	-.4448	.2991	2.3137	1.7881	-.3096
37.87	2.5838	1.7969	-.4373	.2991	2.3044	1.9046	-.3229
39.97	2.5480	1.9168	-.4632	.2987	2.2691	2.0184	-.3[illegible]

TABLE III.- Continued

Wing canard strake: δ_N = Off; $\delta_f = 0^o$; $C_T = 0$

RUN 352

ALPHA	CL	CD	CM	CT	CLF	CDE	CME
-1.90	-.1037	.0269	-.0002	0.0000	-.1037	.0269	-.0002
.00	.0063	.0235	.0103	0.0000	.0063	.0235	.0103
2.02	.1207	.0264	.0220	0.0000	.1207	.0264	.0220
4.07	.2519	.0371	.0321	0.0000	.2519	.0371	.0321
6.01	.3894	.0576	.0420	0.0000	.3894	.0576	.0420
8.02	.5390	.0866	.0531	0.0000	.5390	.0866	.0531
10.09	.6895	.1315	.0639	0.0000	.6895	.1315	.0639
12.04	.8371	.1840	.0813	0.0000	.8371	.1840	.0813
14.07	.9768	.2448	.0920	0.0000	.9768	.2448	.0920
16.08	1.1166	.3160	.1080	0.0000	1.1166	.3160	.1080
17.98	1.2616	.3891	.1377	0.0000	1.2616	.3891	.1377
19.97	1.3957	.4821	.1493	0.0000	1.3957	.4821	.1493
21.94	1.5148	.5919	.1618	0.0000	1.5148	.5919	.1618
23.94	1.6384	.7006	.1732	0.0000	1.6384	.7006	.1732
27.67	1.7096	.9099	.1473	0.0000	1.7096	.9099	.1473
12.67	.8238	.1816	.0773	0.0000	.8238	.1816	.0773

RUN 351

ALPHA	CL	CD	CM	CT	CLF	CDE	CME
12.74	.8695	.1975	.0869	0.0000	.8695	.1975	.0869
14.09	.9629	.2571	.0958	0.0000	.9629	.2571	.0958
16.06	1.1156	.3116	.1113	0.0000	1.1156	.3116	.1113
18.08	1.2575	.3958	.1404	0.0000	1.2575	.3958	.1404
20.03	1.4057	.4950	.1528	0.0000	1.4057	.4950	.1528
22.12	1.5296	.5995	.1645	0.0000	1.5296	.5995	.1645
23.98	1.5994	.6835	.1355	0.0000	1.5994	.6835	.1355
26.01	1.7044	.8026	.1405	0.0000	1.7044	.8026	.1405
28.01	1.8188	.9317	.1576	0.0000	1.8188	.9317	.1576
30.18	1.9171	1.0672	.1806	0.0000	1.9171	1.0672	.1806
32.07	1.9960	1.1951	.2129	0.0000	1.9960	1.1951	.2129
33.91	2.0263	1.3114	.2380	0.0000	2.0263	1.3114	.2380
36.04	2.0325	1.4272	.2590	0.0000	2.0325	1.4272	.2590
37.96	2.0296	1.5298	.2797	0.0000	2.0296	1.5298	.2797
39.62	2.0029	1.6225	.2892	0.0000	2.0029	1.6225	.2892

Wing canard strake: $\delta_N = 0^o$; $\delta_f = 0^o$; $C_T = 0$

RUN 355

ALPHA	CL	CD	CM	CT	CLF	CDE	CME
-1.99	-.1136	.0292	-.0021	0.0000	-.1136	.0292	-.0021
.00	.0091	.0254	.0088	0.0000	.0091	.0254	.0088
2.05	.1293	.0295	.0200	0.0000	.1293	.0295	.0200
4.08	.2644	.0401	.0293	0.0000	.2644	.0401	.0293
5.98	.3961	.0601	.0365	0.0000	.3961	.0601	.0365
8.10	.5575	.0939	.0475	0.0000	.5575	.0939	.0475
9.97	.6922	.1338	.0585	0.0000	.6922	.1338	.0585
11.97	.8335	.1860	.0759	0.0000	.8335	.1860	.0759
14.08	.9661	.2501	.0899	0.0000	.9661	.2501	.0899
16.04	1.1279	.3204	.1056	0.0000	1.1279	.3204	.1056
18.08	1.2718	.4083	.1355	0.0000	1.2718	.4083	.1355
19.96	1.3946	.4969	.1489	0.0000	1.3946	.4969	.1489
21.99	1.5284	.6016	.1632	0.0000	1.5284	.6016	.1632
24.05	1.6595	.7169	.1737	0.0000	1.6595	.7169	.1737
27.69	1.8048	.9197	.1571	0.0000	1.8048	.9197	.1571

RUN 313

ALPHA	CL	CD	CM	CT	CLF	CDE	CME
12.75	.8715	.2047	.0852	0.0000	.8715	.2047	.0852
14.10	.9822	.2498	.0912	0.0000	.9822	.2498	.0912
16.03	1.1066	.3177	.1039	0.0000	1.1066	.3177	.1039
18.06	1.2659	.4081	.1367	0.0000	1.2659	.4081	.1367
19.04	1.3326	.4536	.1431	0.0000	1.3326	.4536	.1431
20.05	1.3978	.5018	.1496	0.0000	1.3978	.5018	.1496
21.95	1.5205	.6008	.1636	0.0000	1.5205	.6008	.1636
23.01	1.5852	.6595	.1682	0.0000	1.5852	.6595	.1682
24.03	1.6457	.7168	.1729	0.0000	1.6457	.7168	.1729
24.86	1.6652	.7475	.1377	0.0000	1.6652	.7475	.1377
25.99	1.7065	.8155	.1443	0.0000	1.7065	.8155	.1443
27.07	1.7617	.8804	.1528	0.0000	1.7617	.8804	.1528
28.04	1.8091	.9419	.1663	0.0000	1.8091	.9419	.1663
29.98	1.8533	1.0052	.1786	0.0000	1.8533	1.0052	.1786
30.04	1.8901	1.0672	.1896	0.0000	1.8901	1.0672	.1896
31.95	1.9698	1.1968	.2184	0.0000	1.9698	1.1968	.2184
33.97	2.0177	1.3240	.2455	0.0000	2.0177	1.3240	.2455
35.98	2.0376	1.4422	.2679	0.0000	2.0376	1.4422	.2679
37.96	2.0276	1.5639	.2836	0.0000	2.0276	1.5639	.2836
39.95	1.9999	1.6378	.2946	0.0000	1.9999	1.6378	.2946

TABLE III.- Continued

Wing canard strake: $\delta_N = 0^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0.20$

RUN 316

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.92	-.1092	-.1755	-.0031	.2001	-.1075	.0244	-.0031
.17	.0112	-.1797	.0063	.2003	.0188	.0218	.0063
2.04	.1379	-.1746	.0167	.1996	.1298	.0249	.0167
3.96	.2718	-.1642	.0251	.1997	.2580	.0351	.0251
5.98	.4294	-.1430	.0331	.2003	.4065	.0562	.0331
8.08	.5951	-.1087	.0422	.1992	.5571	.0890	.0422
10.15	.7662	-.0624	.0538	.1996	.7087	.1331	.0538
11.97	.8762	-.0146	.0672	.1987	.8352	.1789	.0672
13.99	1.0404	.0517	.0804	.1998	.9873	.2446	.0804
16.04	1.1926	.1295	.0932	.1992	1.1377	.3197	.0932
17.96	1.3468	.2156	.1207	.1990	1.2895	.4049	.1207
19.96	1.4884	.3134	.1338	.1991	1.4206	.5005	.1338

RUN 314

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.89	.9403	.0114	.0696	.1992	.9081	.2048	.0696
14.05	1.0222	.0490	.0758	.1984	.9760	.2415	.0758
16.07	1.1949	.1287	.0898	.1987	1.1299	.3197	.0898
18.08	1.3310	.2143	.0948	.1987	1.2696	.4032	.0948
19.88	1.3899	.2603	.1016	.1984	1.3246	.4479	.1016
20.10	1.44[illegible]	.3127	.1036	.1983	1.3937	.4984	.1036
21.05	1.5276	.3609	.1062	.1984	1.4517	.5457	.1062
22.08	1.5716	.4122	.1097	.1985	1.5069	.5961	.1097
23.00	1.6431	.4677	.1101	.1980	1.5695	.6499	.1101
23.99	1.7058	.5227	.1174	.1980	1.6276	.7037	.1174
25.08	1.7727	.5905	.1152	.1962	1.6897	.7640	.1152
26.05	1.8223	.6463	.1202	.1984	1.7387	.8246	.1202
26.98	1.8939	.7164	.1261	.1976	1.8044	.8873	.1261
27.97	1.9571	.7829	.1381	.1981	1.8596	.9577	.1381
29.07	2.0171	.8609	.1516	.1986	1.9205	1.0344	.1516
30.08	2.0612	.9297	.1631	.1987	1.9617	1.1002	.1631
31.98	2.1401	1.0594	.1866	.1982	2.0350	1.2279	.1866
33.99	2.2034	1.2014	.2095	.1977	2.0946	1.3653	.2095
35.96	2.2273	1.3202	.2278	.1973	2.1115	1.4799	.2278
38.07	2.2375	1.4449	.2413	.1970	2.1158	1.6066	.2413
40.07	2.2335	1.5631	.2461	.1974	2.1066	1.7142	.2461

Wing canard strake: $\delta_N = 0^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0.30$

RUN 317

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.95	-.1177	-.2696	-.0047	.3004	-.1076	.0309	-.0047
.07	.0128	-.2729	.0035	.3006	.0118	.0277	.0035
2.03	.1309	-.2696	.0133	.3017	.1202	.0317	.0133
4.07	.2771	-.2576	.0223	.3010	.2597	.0426	.0223
6.07	.4301	-.2352	.0296	.3011	.4063	.0642	.0296
8.04	.5937	-.2025	.0370	.3010	.5516	.0955	.0370
10.12	.7566	-.1577	.0479	.3013	.7014	.1399	.0479
12.01	.9001	-.1056	.0631	.3016	.8376	.1896	.0631
14.00	1.0940	-.0382	.0710	.3004	.9813	.2535	.0710
16.02	1.2271	.0429	.0858	.3004	1.1397	.3316	.0858
18.09	1.3769	.1352	.1116	.3003	1.2897	.4196	.1116
20.03	1.5296	.2321	.1294	.2995	1.4268	.5134	.1294

RUN 319

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.71	.9333	-.0833	.0571	.2996	.8676	.2090	.0571
14.09	1.0706	-.0367	.0628	.3009	.9776	.2551	.0628
16.07	1.2073	.0427	.0782	.2996	1.1196	.3299	.0782
18.09	1.3532	.1318	.0886	.2996	1.2603	.4164	.0886
18.93	1.4098	.1685	.0915	.2996	1.3117	.4516	.0915
19.99	1.4878	.2217	.0965	.2997	1.3897	.5028	.0965
20.98	1.5338	.2712	.0997	.2995	1.4458	.5508	.0997
22.01	1.6136	.3230	.1012	.3000	1.5019	.6017	.1012
23.09	1.6909	.3835	.1059	.2993	1.5696	.6588	.1059
24.07	1.7451	.4384	.1059	.2997	1.6271	.7131	.1059
24.93	1.8036	.4956	.1081	.2993	1.6769	.7670	.1081
25.98	1.8688	.5620	.1127	.2996	1.7376	.8312	.1127
27.07	1.9330	.6434	.1205	.2989	1.8177	.9090	.1205
28.02	2.0054	.7065	.1290	.2992	1.8669	.9706	.1290
28.96	2.0641	.7767	.1392	.2992	1.9193	1.0384	.1392
30.07	2.1130	.8492	.1493	.2991	1.9611	1.1090	.1493
32.11	2.2081	.9806	.1789	.2986	2.0499	1.2524	.1789
34.12	2.2777	1.1441	.2028	.2980	2.1101	1.3913	.2028
36.06	2.3063	1.2659	.2158	.2986	2.1300	1.5091	.2158
37.93	2.3195	1.3840	.2312	.2991	2.1344	1.6207	.2312
39.12	2.3701	1.4573	.2373	.2993	2.1317	1.6893	.2373
40.11	2.3217	1.5205	.2379	.2988	2.1291	1.7482	.2379

TABLE III.- Continued

Wing canard strake: $\delta_N = 10^o$; $\delta_f = 0^o$; $C_T = 0$

RUN 358

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.93	-.0318	.0296	-.0455	0.0000	-.0318	.0296	-.0455
.01	.0792	.0276	-.0333	0.0000	.0792	.0276	-.0333
2.08	.2002	.0332	-.0226	0.0000	.2002	.0332	-.0226
4.05	.3318	.0463	-.0135	0.0000	.3318	.0463	-.0135
6.04	.4741	.0696	-.0038	0.0000	.4741	.0696	-.0038
7.96	.6081	.1013	.0041	0.0000	.6081	.1013	.0041
10.13	.7644	.1481	.0197	0.0000	.7644	.1481	.0197
12.02	.8987	.1973	.0403	0.0000	.8987	.1973	.0403
13.99	1.0533	.2634	.0503	0.0000	1.0533	.2634	.0503
16.08	1.1953	.3424	.0650	0.0000	1.1953	.3424	.0650
17.95	1.3317	.4250	.0953	0.0000	1.3317	.4250	.0953
17.97	1.3204	.4234	.0930	0.0000	1.3204	.4234	.0930
19.98	1.4649	.5243	.1115	0.0000	1.4649	.5243	.1115

RUN 318

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.81	.9570	.2252	.0364	0.0000	.9570	.2252	.0364
13.95	1.0396	.2637	.0422	0.0000	1.0396	.2637	.0422
16.00	1.1837	.3418	.0572	0.0000	1.1837	.3418	.0572
17.95	1.3159	.4241	.0905	0.0000	1.3159	.4241	.0905
18.98	1.3936	.4758	.0982	0.0000	1.3936	.4758	.0982
20.14	1.4721	.5340	.1092	0.0000	1.4721	.5340	.1092
21.06	1.5296	.5801	.1157	0.0000	1.5296	.5801	.1157
22.04	1.5917	.6362	.1191	0.0000	1.5917	.6362	.1191
23.03	1.6474	.6900	.1244	0.0000	1.6474	.6900	.1244
23.96	1.7034	.7429	.1306	0.0000	1.7034	.7429	.1306
24.96	1.7155	.7857	.0948	0.0000	1.7155	.7857	.0948
26.01	1.7760	.8502	.1036	0.0000	1.7760	.8502	.1036
27.01	1.8299	.9141	.1130	0.0000	1.8299	.9141	.1130
27.96	1.8844	.9789	.1236	0.0000	1.8844	.9789	.1236
29.08	1.9373	1.0528	.1390	0.0000	1.9373	1.0528	.1390
30.05	1.9797	1.1179	.1558	0.0000	1.9797	1.1179	.1558
32.04	2.0348	1.2421	.1860	0.0000	2.0348	1.2421	.1860
34.01	2.0723	1.3636	.2189	0.0000	2.0723	1.3636	.2189
35.98	2.0721	1.4685	.2441	0.0000	2.0721	1.4685	.2441
37.96	2.0582	1.5690	.2643	0.0000	2.0582	1.5690	.2643
40.01	2.0370	1.6711	.2716	0.0000	2.0370	1.6711	.2716

Wing canard strake: $\delta_N = 10^o$; $\delta_f = 0^o$; $C_T = 0.20$

RUN 359

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-2.00	.0080	-.1703	-.0745	.1970	-.0214	.0248	-.0437
.04	.1744	-.1707	-.0665	.1969	.0901	.0232	-.0358
2.09	.2675	-.1633	-.0566	.1969	.2212	.0293	-.0258
4.05	.3944	-.1488	-.0497	.1972	.3465	.0426	-.0189
6.06	.5545	-.1215	-.0437	.1975	.4988	.0882	-.0129
8.01	.7017	-.0864	-.0364	.1975	.6406	.1014	-.0055
10.01	.8554	-.0421	-.0223	.1976	.7878	.1436	.0086
12.08	1.0090	.0178	-.0071	.1973	.9349	.2007	.0237
14.11	1.1735	.0930	-.0042	.1969	1.0931	.2777	.0266
15.99	1.3270	.1724	.0082	.1960	1.2365	.3494	.0389
17.99	1.4803	.2699	.0334	.1959	1.3884	.4429	.0640
20.03	1.6266	.3762	.0411	.1971	1.5279	.5469	.0720

RUN 317

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.82	1.0497	.0457	-.0187	.1970	.9990	.2281	.0122
14.08	1.1707	.0931	-.0155	.1974	1.0901	.2733	.0154
16.00	1.3188	.1731	-.0048	.1976	1.2371	.3506	.0261
18.12	1.4712	.2719	.0024	.1973	1.3782	.4459	.0333
18.13	1.4692	.2716	.0022	.1974	1.3761	.4457	.0331
19.04	1.5315	.3168	.0036	.1976	1.4356	.4895	.0345
20.01	1.5895	.3653	.0040	.1971	1.4899	.5359	.0348
21.04	1.6662	.4245	.0054	.1973	1.5644	.5936	.0363
22.09	1.7292	.4814	.0076	.1979	1.6241	.6491	.0383
23.20	1.7970	.5467	.0084	.1978	1.6887	.7122	.0393
23.99	1.8413	.5918	.0089	.1970	1.7311	.7572	.0397
25.02	1.9188	.6669	.0111	.1969	1.8059	.8281	.0419
26.00	1.9776	.7306	.0155	.1973	1.8616	.8902	.0463
27.07	2.0451	.8061	.0216	.1975	1.9260	.9637	.0525
28.07	2.1025	.8781	.0292	.1971	1.9810	1.0332	.0600
29.01	2.1542	.9460	.0398	.1970	2.0302	1.0991	.0706
29.93	2.1961	1.0106	.0483	.1973	2.0675	1.1617	.0792
32.12	2.2888	1.1716	.0769	.1979	2.1561	1.3182	.1078
33.95	2.3318	1.2977	.0937	.1978	2.1944	1.4397	.1267
36.08	2.3649	1.4397	.1164	.1981	2.2273	1.5772	.1474
38.08	2.3689	1.5631	.1336	.1994	2.2206	1.6963	.1648
40.05	2.3693	1.6883	.1455	.2001	2.2159	1.8168	.1768

TABLE III.- Continued

Wing canard strake: $\delta_N = 10^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0.30$

RUN 360

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.93	.0218	-.2772	-.0902	.3069	-.0217	.0266	-.0423
.09	.1484	-.2659	-.0784	.2957	.0944	.0252	-.0322
1.98	.2684	-.2578	-.0708	.2959	.2070	.0316	-.0246
4.13	.4302	-.2423	-.0652	.2992	.3574	.0469	-.0186
6.07	.5902	-.2155	-.0589	.2984	.4976	.0712	-.0123
8.06	.7389	-.1779	-.0513	.2990	.6462	.1086	-.0045
10.04	.8931	-.1287	-.0425	.2984	.7909	.1516	.0041
12.06	1.0521	-.0685	-.0293	.2984	.9400	.2100	.0174
14.14	1.2177	.0071	-.0208	.2985	1.0957	.2795	.0258
16.07	1.3773	.0888	-.0043	.2975	1.2448	.3560	.0422
17.97	1.5346	.1787	.0207	.2995	1.3941	.4443	.0675
20.07	1.6914	.2903	.0308	.3008	1.5407	.5564	.0778

RUN 319

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.04	1.0864	-.0541	-.0345	.3002	.9709	.2230	.0124
14.02	1.2049	-.0014	-.0307	.3009	1.0874	.2735	.0164
15.97	1.3564	.0800	-.0196	.3018	1.2247	.3513	.0275
18.10	1.5214	.1819	-.0112	.3029	1.3787	.4491	.0362
18.96	1.5798	.2303	-.0115	.2981	1.4355	.4911	.0351
20.04	1.6547	.2866	-.0103	.2993	1.5049	.5457	.0365
20.94	1.7099	.3332	-.0104	.3010	1.5551	.5913	.0366
21.99	1.7846	.3950	-.0104	.3014	1.6250	.6506	.0367
22.96	1.8483	.4542	-.0089	.3008	1.6847	.7066	.0381
24.01	1.9149	.5216	-.0107	.2991	1.7476	.7695	.0361
24.97	1.9855	.5893	-.0080	.2980	1.8147	.8335	.0385
25.98	2.0492	.6568	-.0066	.2983	1.8760	.8982	.0400
27.09	2.1257	.7381	-.0008	.2999	1.9448	.9773	.0460
28.05	2.1964	.8144	.0071	.3007	2.0111	1.0512	.0541
28.99	2.2367	.8781	.0143	.3008	2.0475	1.1119	.0614
29.95	2.2946	.9566	.0268	.3013	2.1012	1.1874	.0739
31.99	2.3857	1.1125	.0535	.2991	2.1856	1.3348	.1063
33.99	2.4401	1.2568	.0722	.2997	2.2319	1.4725	.1190
35.93	2.4707	1.3898	.0889	.3003	2.2548	1.5987	.1358
37.97	2.4797	1.5237	.1060	.3000	2.2549	1.7246	.1529
39.95	2.4818	1.6551	.1162	.3007	2.2517	1.8485	.1632

Wing canard strake: $\delta_N = 20^{\circ}$; $\delta_f = 0^{\circ}$; $C_T = 0$

RUN 361

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.92	.0253	.0358	-.0845	0.0000	.0253	.0356	-.0845
.10	.1355	.0353	-.0681	0.0000	.1355	.0353	-.0681
2.05	.2535	.0424	-.0552	0.0000	.2535	.0424	-.0552
3.95	.3731	.0559	-.0467	0.0000	.3731	.0559	-.0467
6.01	.5144	.0806	-.0351	0.0000	.5144	.0806	-.0351
8.10	.6698	.1153	-.0195	0.0000	.6698	.1153	-.0195
10.06	.8091	.1593	-.0061	0.0000	.8091	.1593	-.0061
11.97	.9445	.2123	.0132	0.0000	.9445	.2123	.0132
14.07	1.0959	.2834	.0223	0.0000	1.0959	.2834	.0223
16.07	1.2381	.3620	.0409	0.0000	1.2381	.3620	.0409
18.08	1.3714	.4503	.0691	0.0000	1.3714	.4503	.0691
19.96	1.5070	.5461	.0869	0.0000	1.5070	.5461	.0869
22.07	1.6288	.6557	.1006	0.0000	1.6288	.6552	.1006
24.01	1.7445	.7671	.1132	0.0000	1.7445	.7671	.1132
27.64	1.8895	.9739	.0994	0.0000	1.8895	.9739	.0994

RUN 322

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.70	.9921	.2353	.0076	0.0000	.9921	.2353	.0076
14.09	1.0877	.2823	.0110	0.0000	1.0877	.2823	.0110
16.09	1.2212	.3585	.0265	0.0000	1.2212	.3585	.0265
17.96	1.3498	.4427	.0378	0.0000	1.3498	.4427	.0379
19.12	1.4135	.4960	.0432	0.0000	1.4135	.4960	.0432
20.07	1.4744	.5421	.0457	0.0000	1.4744	.5421	.0457
21.09	1.5350	.5933	.0514	0.0000	1.5350	.5933	.0514
22.01	1.5851	.6399	.0556	0.0000	1.5851	.6399	.0556
23.05	1.6428	.6965	.0582	0.0000	1.6428	.6965	.0582
23.95	1.6913	.7466	.0623	0.0000	1.6913	.7466	.0623
25.09	1.7554	.8151	.0690	0.0000	1.7554	.8151	.0690
26.04	1.8090	.8747	.0761	0.0000	1.8090	.8747	.0761
27.03	1.8527	.9353	.0831	0.0000	1.8527	.9353	.0831
27.99	1.9144	1.0042	.0980	0.0000	1.9144	1.0042	.0980
28.98	1.9566	1.0677	.1135	0.0000	1.9566	1.0677	.1135
30.05	1.9977	1.1373	.1308	0.0000	1.9977	1.1373	.1308
32.04	2.0517	1.2617	.1657	0.0000	2.0517	1.2617	.1657
34.01	2.0775	1.3759	.2002	0.0000	2.0775	1.3759	.2002
35.97	2.0834	1.4849	.2242	0.0000	2.0834	1.4849	.2242
37.96	2.0733	1.5888	.2428	0.0000	2.0733	1.5888	.2428
40.08	2.0311	1.6822	.2596	0.0000	2.0311	1.6822	.2596

TABLE III.- Continued

Wing canard strake: δ_N = 20°; δ_f = 0°; C_T = 0.20

RUN 362

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.92	.1786	-.1602	-.1555	.1979	.0652	.0279	-.0946
-.01	.2422	-.1563	-.1459	.1974	.1747	.0292	-.0851
1.99	.3705	-.1465	-.1390	.1981	.2964	.0371	-.0780
4.08	.5227	-.1284	-.1288	.1981	.4419	.0524	-.0678
6.06	.6691	-.0990	-.1224	.1977	.5877	.0786	-.0615
8.01	.8214	-.0586	-.1161	.1982	.7288	.1163	-.0551
10.08	.9774	-.0043	-.1064	.1982	.8780	.1672	-.0456
12.12	1.1408	.0643	-.0938	.1974	1.0399	.2315	-.0330
13.98	1.2861	.1366	-.0929	.1972	1.1799	.3001	-.0322
16.13	1.4474	.2301	-.0814	.1971	1.3312	.3892	-.0208
18.03	1.5972	.3257	-.0583	.1975	1.4754	.4813	.0025
20.02	1.7483	.4377	-.0502	.1978	1.6210	.5892	.0107
22.04	1.8850	.5570	-.0416	.1974	1.7507	.7036	.0142
23.99	2.0167	.6855	-.0362	.1976	1.8795	.8276	.0246
25.96	2.1169	.8121	-.0560	.1977	1.9748	.9495	.0048
27.50	2.1966	.9156	-.0709	.1969	2.0415	1.0486	-.0103

RUN 373

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.77	1.1876	.0868	-.1102	.1985	1.0802	.2535	-.0491
14.05	1.2867	.1366	-.1057	.1973	1.1743	.3001	-.0450
16.07	1.4385	.2268	-.0981	.1980	1.3219	.3848	-.0371
17.97	1.5702	.3157	-.0945	.1986	1.4481	.4717	-.0334
18.96	1.6411	.3686	-.0939	.1980	1.5166	.5223	-.0329
20.08	1.7194	.4279	-.0949	.1978	1.5861	.5793	-.0340
21.06	1.7759	.4838	-.0973	.1983	1.6456	.6334	-.0363
22.01	1.8418	.5423	-.0942	.1975	1.7096	.6890	-.0334
23.01	1.8982	.6015	-.0968	.1975	1.7635	.7459	-.0360
23.90	1.9556	.6621	-.0975	.1975	1.8188	.8042	-.0367
24.98	2.0247	.7297	-.0943	.1980	1.8848	.8698	-.0334
26.10	2.1096	.8149	-.0860	.1976	1.9670	.9519	-.0251
27.04	2.1677	.8842	-.0811	.1974	2.0237	1.0188	-.0203
27.97	2.2227	.9531	-.0696	.1979	2.0757	1.0856	-.0087
29.07	2.2736	1.0319	-.0603	.1977	2.1242	1.1614	.0006
29.95	2.3169	1.1003	-.0521	.1968	2.1643	1.2269	.0085
31.98	2.3986	1.2488	-.0248	.1966	2.2336	1.3699	.0357
34.03	2.4380	1.3950	.0039	.1976	2.2781	1.5111	.0647
35.97	2.4554	1.5247	.0282	.1959	2.2931	1.6343	.0885
38.07	2.4538	1.6539	.0405	.1985	2.2853	1.7589	.1016
39.93	2.4478	1.7732	.0529	.1986	2.2759	1.8726	.1139

Wing canard strake: δ_N = 20°; δ_f = 0°; C_T = 0.30

RUN 363

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.94	.1568	-.2576	-.1848	.2997	.0638	.0276	-.0925
.07	.2962	-.2512	-.1734	.2997	.1833	.0303	-.0812
2.04	.4148	-.2388	-.1680	.2997	.3024	.0389	-.0757
4.12	.5669	-.2172	-.1611	.2998	.4444	.0564	-.0689
6.02	.7180	-.1864	-.1563	.3001	.5863	.0833	-.0639
8.02	.8860	-.1461	-.1459	.2990	.7255	.1179	-.0539
10.03	1.0332	-.0915	-.1357	.3001	.8831	.1683	-.0433
12.04	1.1695	-.0260	-.1158	.2993	1.0307	.2277	-.0237
14.00	1.3565	.0533	-.1056	.2991	1.1892	.3012	-.0134
15.97	1.5176	.1430	-.0971	.3004	1.3409	.3861	-.0046
18.00	1.6734	.2463	-.0841	.2999	1.4887	.4826	.0082
19.93	1.8174	.3573	-.0782	.2971	1.6267	.5851	.0132
22.02	1.9715	.4873	-.0708	.2978	1.7722	.7085	.0209
23.98	2.1068	.6174	-.0683	.2981	1.8996	.8319	.0236
25.97	2.2409	.7590	-.0621	.2995	2.0256	.9671	.0301
27.08	2.2516	.8201	-.1114	.2989	2.0325	1.0237	-.0194

RUN 374

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.59	1.2257	-.0105	-.1380	.2995	1.0644	.2418	-.0458
14.07	1.3386	.0468	-.1370	.3009	1.1701	.2959	-.0444
16.15	1.5089	.1429	-.1305	.3016	1.3310	.3864	-.0377
18.00	1.6515	.2381	-.1234	.3005	1.4664	.4750	-.0309
19.08	1.7207	.2945	-.1231	.3003	1.5314	.5276	-.0307
19.98	1.7824	.3453	-.1284	.3005	1.5893	.5755	-.0359
20.93	1.8444	.4001	-.1352	.3007	1.6473	.6273	-.0426
22.02	1.9218	.4673	-.1296	.3013	1.7201	.6912	-.0368
23.08	1.9913	.5339	-.1318	.3015	1.7854	.7541	-.0390
24.01	2.0517	.5959	-.1326	.3013	1.8424	.8126	-.0399
25.02	2.1218	.6676	-.1338	.3011	1.9088	.8805	-.0411
25.91	2.1873	.7357	-.1276	.3004	1.9715	.9447	-.0351
27.07	2.2441	.8135	-.1197	.3002	2.0242	1.0180	-.0273
27.88	2.3080	.8836	-.1142	.2997	2.0857	1.0846	-.0219
29.07	2.3771	.9755	-.1006	.3003	2.1503	1.1722	-.0081
30.02	2.4246	1.0492	-.0912	.3006	2.1942	1.2423	.0014
32.09	2.5030	1.2098	-.0742	.3006	2.2658	1.3945	.0183
34.08	2.5577	1.3560	-.0440	.2994	2.3154	1.5320	.0482
36.03	2.5783	1.4955	-.0200	.2997	2.3298	1.6630	.0722
37.98	2.5788	1.6241	-.0102	.3007	2.3239	1.7835	.0824
39.99	2.5750	1.7580	.0019	.3009	2.3145	1.9085	.0943

TABLE III.- Continued

Wing canard strake: $\delta_N = 30^o$; $\delta_f = 0^o$; $C_T = 0$

RUN 364

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-2.00	.0223	.0437	-.1080	0.0000	.0223	.0437	-.1080
-1.90	.0597	.0421	-.1030	0.0000	.0597	.0421	-.1030
.08	.1704	.0436	-.0887	0.0000	.1704	.0436	-.0887
1.99	.2863	.0511	-.0752	0.0000	.2863	.0511	-.0752
4.00	.4158	.0665	-.0640	0.0000	.4158	.0665	-.0640
6.08	.5568	.0921	-.0511	0.0000	.5568	.0921	-.0511
7.98	.6887	.1229	-.0356	0.0000	.6887	.1229	-.0356
9.97	.8217	.1667	-.0205	0.0000	.8217	.1667	-.0205
12.11	.9747	.2277	-.0016	0.0000	.9747	.2277	-.0016
13.92	1.1147	.2923	.0056	0.0000	1.1147	.2923	.0056
16.03	1.2505	.3725	.0215	0.0000	1.2505	.3725	.0215
17.97	1.3915	.4610	.0537	0.0000	1.3915	.4610	.0537
20.07	1.5349	.5676	.0688	0.0000	1.5349	.5676	.0688
21.97	1.6496	.6691	.0822	0.0000	1.6496	.6691	.0822
23.96	1.7616	.7826	.0960	0.0000	1.7616	.7826	.0960
25.95	1.8205	.8837	.0712	0.0000	1.8205	.8837	.0712

RUN 319

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.70	1.0178	.2489	-.0040	0.0000	1.0178	.2489	-.0040
14.00	1.1152	.2957	.0021	0.0000	1.1152	.2957	.0021
16.10	1.2650	.3807	.0174	0.0000	1.2650	.3807	.0174
18.03	1.4005	.4685	.0468	0.0000	1.4005	.4685	.0468
18.99	1.4648	.5158	.0532	0.0000	1.4648	.5158	.0532
19.99	1.5329	.5684	.0600	0.0000	1.5329	.5684	.0600
21.08	1.5897	.6221	.0670	0.0000	1.5897	.6221	.0670
21.98	1.6469	.6717	.0729	0.0000	1.6469	.6717	.0729
22.98	1.7125	.7313	.0799	0.0000	1.7125	.7313	.0799
24.05	1.7747	.7949	.0901	0.0000	1.7747	.7949	.0901
25.00	1.7763	.8336	.0540	0.0000	1.7763	.8336	.0540
25.97	1.8294	.8914	.0631	0.0000	1.8294	.8914	.0631
26.99	1.8845	.9594	.0739	0.0000	1.8845	.9594	.0739
28.08	1.9434	1.0330	.0886	0.0000	1.9434	1.0330	.0886
28.99	1.9708	1.0880	.0985	0.0000	1.9708	1.0880	.0985
30.04	2.0149	1.1588	.1163	0.0000	2.0149	1.1588	.1163
30.98	2.0450	1.2181	.1347	0.0000	2.0450	1.2181	.1347
31.99	2.0664	1.2806	.1525	0.0000	2.0664	1.2806	.1525
34.01	2.0973	1.4004	.1950	0.0000	2.0973	1.4004	.1950
36.01	2.0939	1.5049	.2236	0.0000	2.0939	1.5049	.2236
37.94	2.0797	1.6040	.2409	0.0000	2.0797	1.6040	.2409
39.95	2.0348	1.6891	.2588	0.0000	2.0348	1.6891	.2588

Wing canard strake: $\delta_N = 30^o$; $\delta_f = 0^o$; $C_T = 0.20$

RUN 365

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.96	.2229	-.1369	-.2247	.1957	.1308	.0358	-.1366
.10	.3486	-.1324	-.2132	.1969	.2498	.0380	-.1246
1.98	.4774	-.1210	-.2057	.1972	.3779	.0483	-.1169
3.99	.6205	-.0978	-.1985	.1970	.5104	.0655	-.1099
6.04	.7676	-.0632	-.1937	.1971	.6516	.0961	-.1050
8.10	.9219	-.0158	-.1853	.1961	.8009	.1385	-.0970
9.95	1.0682	.0377	-.1786	.1971	.9416	.1886	-.0899
11.99	1.2255	.1068	-.1665	.1975	1.0934	.2536	-.0776
14.05	1.3849	.1901	-.1652	.1971	1.2479	.3317	-.0763
15.90	1.5267	.2750	-.1542	.1969	1.3853	.4121	-.0656
17.99	1.6887	.3836	-.1284	.1962	1.5429	.5149	-.0401
19.91	1.8229	.4902	-.1211	.1971	1.6771	.6171	-.0325
21.95	1.9604	.6148	-.1119	.1967	1.8055	.7358	-.0234
23.95	2.0949	.7484	-.1057	.1968	1.9358	.8642	-.0171
26.02	2.2250	.8957	-.0976	.1966	2.0690	1.0056	-.0091

RUN 320

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.72	1.2901	.1393	-.1794	.1971	1.1964	.2841	-.0907
14.08	1.3970	.1930	-.1756	.1982	1.2541	.3354	-.0864
16.01	1.5287	.2805	-.1661	.1959	1.3877	.4166	-.0780
18.06	1.6830	.3859	-.1628	.1968	1.5367	.5174	-.0743
18.95	1.7540	.4334	-.1351	.1968	1.6055	.5646	-.0465
20.08	1.8445	.5041	-.1291	.1972	1.6937	.6306	-.0404
20.94	1.9002	.5543	-.1249	.1976	1.7468	.6788	-.0359
21.97	1.9669	.6179	-.1211	.1970	1.8117	.7393	-.0324
23.03	2.0380	.6880	-.1173	.1973	1.8804	.8066	-.0285
23.91	2.0902	.7454	-.1146	.1969	1.9312	.8613	-.0260
24.98	2.1725	.8252	-.1047	.1972	2.0110	.9384	-.0159
26.02	2.1755	.8769	-.1489	.1969	2.0173	.9870	-.0603
26.95	2.2378	.9476	-.1435	.1974	2.0723	1.0557	-.0547
27.97	2.2979	1.0260	-.1333	.1972	2.1308	1.1306	-.0446
29.01	2.3469	1.1029	-.1223	.1964	2.1789	1.2040	-.0341
29.94	2.3829	1.1659	-.1148	.1976	2.2119	1.2689	-.0259
30.00	2.3939	1.1800	-.1092	.1972	2.2231	1.2786	-.0205
31.98	2.4633	1.3257	-.0814	.1983	2.2882	1.4189	.0079
33.98	2.5051	1.4695	-.0506	.1980	2.3177	1.5563	.0383
35.95	2.5199	1.6015	-.0264	.1987	2.3384	1.6825	.0630
38.07	2.5091	1.7336	-.0082	.1974	2.3260	1.8074	.0807
40.02	2.4934	1.8560	.0000	.1974	2.3079	1.9234	.0889

TABLE III.- Continued

Wing canard strake: $\delta_N = 30^\circ$; $\delta_f = 0^\circ$; $C_T = 0.30$

RUN 366

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.95	.2497	-.2362	-.2633	.2986	.1293	.0273	-.1290
-.02	.3942	-.2255	-.2544	.2988	.2449	.0333	-.1199
2.03	.5291	-.2094	-.2495	.2988	.3707	.0439	-.1150
4.10	.6845	-.1827	-.2439	.2990	.5169	.0649	-.1094
6.10	.8407	-.1469	-.2376	.2995	.6643	.0951	-.1029
7.94	.9852	-.1036	-.2284	.2993	.8011	.1324	-.0937
9.97	1.1317	-.0449	-.2197	.2981	.9401	.1835	-.0856
12.11	1.3059	.0324	-.2085	.2985	1.1057	.2538	-.0742
13.98	1.4456	.1140	-.2070	.2977	1.2591	.3282	-.0730
16.07	1.6179	.2101	-.1965	.2983	1.4091	.4171	-.0623
18.01	1.7836	.3171	-.1693	.2978	1.5621	.5163	-.0353
20.00	1.9742	.4316	-.1642	.2983	1.6957	.6233	-.0300
21.97	2.0884	.5590	-.1561	.2976	1.8340	.7423	-.0222
23.94	2.1984	.6898	-.1548	.2997	1.9547	.8682	-.0199
26.01	2.3312	.8411	-.1435	.2990	2.0833	1.0083	-.0090

RUN 321

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.55	1.3395	.0494	-.2234	.2991	1.1373	.2698	-.0888
14.09	1.4721	.1169	-.2203	.3001	1.2633	.3324	-.0852
16.00	1.6254	.2100	-.2128	.2997	1.4098	.4181	-.0780
18.01	1.7734	.3159	-.2069	.3000	1.5504	.5166	-.0719
19.11	1.8503	.3783	-.2027	.2990	1.6243	.5740	-.0681
20.14	1.9164	.4373	-.2053	.2991	1.6869	.6290	-.0707
20.94	1.9737	.4879	-.2085	.2991	1.7415	.6764	-.0739
22.02	2.0428	.5557	-.2074	.2991	1.8071	.7398	-.0729
22.94	2.0916	.6119	-.2101	.2993	1.8527	.7923	-.0754
24.08	2.1609	.6865	-.2116	.2995	1.9184	.8623	-.0768
25.02	2.2159	.7535	-.2083	.2979	1.9719	.9242	-.0743
26.13	2.2916	.8388	-.2008	.2967	2.0492	1.0042	-.0673
27.07	2.3520	.9110	-.1919	.2967	2.1079	1.0723	-.0584
28.07	2.4287	.9963	-.1803	.2978	2.1760	1.1538	-.0463
28.97	2.4711	1.0641	-.1688	.2980	2.2158	1.2177	-.0347
30.07	2.5170	1.1460	-.1591	.2990	2.2579	1.2952	-.0246
31.97	2.5967	1.3018	-.1391	.2994	2.3374	1.4425	-.0043
34.00	2.6411	1.4508	-.1131	.3011	2.3705	1.5825	.0223
35.94	2.6530	1.5826	-.0884	.3023	2.3770	1.7059	.0476
37.92	2.6485	1.7147	-.0742	.3021	2.3685	1.8283	.0617
39.97	2.6309	1.8505	-.0574	.2987	2.3503	1.9528	.0771

Wing canard strake: $\delta_N = 10^\circ$; $\delta_f = 10^\circ$; $C_T = 0$

RUN 377

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-2.02	.1184	.0278	-.1463	0.0000	.1184	.0278	-.1463
-.03	.2267	.0308	-.1322	0.0000	.2267	.0308	-.1322
2.12	.3595	.0396	-.1208	0.0000	.3595	.0396	-.1208
3.97	.4773	.0556	-.1117	0.0000	.4773	.0556	-.1117
6.10	.6312	.0846	-.0987	0.0000	.6312	.0846	-.0987
7.93	.7696	.1206	-.0890	0.0000	.7696	.1206	-.0890
9.97	.9010	.1690	-.0714	0.0000	.9010	.1690	-.0714
11.95	1.0415	.2293	-.0509	0.0000	1.0415	.2293	-.0509
14.10	1.1999	.3066	-.0397	0.0000	1.1999	.3066	-.0397
15.99	1.3159	.3801	-.0232	0.0000	1.3159	.3801	-.0232
18.06	1.4646	.4764	.0103	0.0000	1.4646	.4764	.0103
19.97	1.5924	.5756	.0239	0.0000	1.5924	.5756	.0239
22.07	1.7194	.6891	.0425	0.0000	1.7194	.6891	.0425
24.05	1.8245	.8033	.0576	0.0000	1.8245	.8033	.0576
25.93	1.8879	.9055	.0342	0.0000	1.8879	.9055	.0342

RUN 309

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.68	1.0931	.2550	-.0487	0.0000	1.0931	.2550	-.0487
14.10	1.1883	.3050	-.0444	0.0000	1.1883	.3050	-.0444
15.98	1.3150	.3806	-.0250	0.0000	1.3150	.3806	-.0250
18.04	1.4628	.4777	.0083	0.0000	1.4628	.4777	.0083
20.06	1.6009	.5824	.0247	0.0000	1.6009	.5824	.0247
22.00	1.7175	.6873	.0401	0.0000	1.7175	.6873	.0401
24.06	1.8149	.8004	.0600	0.0000	1.8149	.8004	.0600
26.01	1.8815	.9067	.0377	0.0000	1.8815	.9067	.0377
27.58	1.9800	1.0372	.0638	0.0000	1.9800	1.0372	.0638
30.00	2.0643	1.1732	.0959	0.0000	2.0643	1.1732	.0959
32.03	2.1143	1.3015	.1320	0.0000	2.1143	1.3015	.1320
34.01	2.1269	1.4122	.1641	0.0000	2.1269	1.4122	.1641
35.94	2.1253	1.5166	.1925	0.0000	2.1253	1.5166	.1925
38.02	2.0989	1.6178	.2161	0.0000	2.0989	1.6178	.2161
40.07	2.0434	1.6979	.2267	0.0000	2.0434	1.6979	.2267

TABLE III.- Continued

Wing canard strake: $\delta_N = 10^\circ$; $\delta_f = 10^\circ$; $C_T = 0.20$

RUN 373

ALPHA	CL	CD	CM	CT	CLF	CDI	CME
-1.89	.1642	-.1722	-.1790	.1955	.1366	.0214	-.1485
.01	.2799	-.1697	-.1660	.1969	.2457	.0241	-.1353
2.06	.4076	-.1591	-.1603	.1973	.3643	.0338	-.1294
3.97	.5397	-.1410	-.1520	.1966	.4923	.0498	-.1213
5.97	.7030	-.1105	-.1451	.1971	.6497	.0790	-.1143
8.08	.8619	-.0668	-.1356	.1975	.8006	.1209	-.1049
10.01	1.0059	-.0139	-.1215	.1969	.9385	.1710	-.0907
11.95	1.1561	.0497	-.1050	.1972	1.0879	.2326	-.0742
13.95	1.3080	.1267	-.1009	.1966	1.2282	.3059	-.0702
15.96	1.4630	.2163	-.0877	.1967	1.3769	.3932	-.0569
18.06	1.6254	.3221	-.0599	.1968	1.5378	.4958	-.0291
19.95	1.7492	.4240	-.0510	.1967	1.6510	.5945	-.0203
22.08	1.8998	.5530	-.0381	.1968	1.7953	.7198	-.0073
23.92	2.0119	.6696	-.0292	.1963	1.9074	.8325	.0015
25.92	2.0967	.7913	-.0675	.1968	1.9813	.9506	-.0367

RUN 310

ALPHA	CL	CD	CM	CT	CLF	CDI	CME
12.77	1.2192	.0835	-.1142	.1964	1.1537	.2448	-.0835
14.00	1.3130	.1285	-.1072	.1972	1.2328	.3087	-.0764
15.97	1.4561	.2136	-.0921	.1969	1.3699	.3906	-.0613
18.11	1.6300	.3242	-.0626	.1969	1.5373	.4978	-.0318
20.02	1.7592	.4293	-.0523	.1963	1.6610	.5992	-.0216
22.02	1.8891	.5475	-.0428	.1959	1.7857	.7135	-.0112
24.05	2.0117	.6743	-.0297	.1973	1.9017	.8377	.0011
26.07	2.1006	.7995	-.0586	.1975	1.9843	.9592	-.0277
28.02	2.2044	.9369	-.0374	.1982	2.0843	1.0930	-.0064
29.98	2.2864	1.0728	-.0143	.1984	2.1599	1.2248	.0168
31.95	2.3651	1.2221	.0135	.1977	2.2329	1.3692	.0444
33.92	2.4040	1.3581	.0378	.1978	2.2688	1.5006	.0689
35.95	2.4179	1.4863	.0606	.1976	2.2759	1.6237	.0915
37.97	2.4124	1.6071	[illegible]	.1980	2.2653	1.7398	.1156
39.88	2.3966	1.7210	.0956	.1978	2.2453	1.8605	.1265

Wing canard strake: $\delta_N = 10^\circ$; $\delta_f = 10^\circ$; $C_T = 0.30$

RUN 374

ALPHA	CL	CD	CM	CT	CLF	CDI	CME
-1.87	.1774	-.2739	-.1962	.2988	.1391	.0219	-.1495
-.05	.2950	-.2687	-.1953	.2987	.2336	.0255	-.1387
1.99	.4274	-.2566	-.1782	.2995	.3657	.0363	-.1314
4.03	.5917	-.2348	-.1728	.2995	.5091	.0559	-.1260
6.11	.7397	-.2023	-.1653	.2979	.6567	.0848	-.1186
7.95	.8961	-.1631	-.1541	.2992	.8019	.1215	-.1073
9.95	1.0359	-.1113	-.1384	.2988	.9339	.1696	-.0917
11.96	1.1884	-.0466	-.1194	.2984	1.0769	.2302	-.0728
13.95	1.3503	.0322	-.1163	.2984	1.2297	.3068	-.0697
15.95	1.5108	.1228	-.1022	.2990	1.3800	.3916	-.0555
18.00	1.6703	.2277	-.0753	.2986	1.5301	.4913	-.0287
19.93	1.8137	.3350	-.0650	.2994	1.6643	.5945	-.0182
21.98	1.9570	.4610	-.0528	.2983	1.7991	.7141	-.0062
23.98	2.0911	.5931	-.0477	.2985	1.9243	.8406	-.0011
25.93	2.2103	.7281	-.0377	.2990	2.0348	.9702	.0090

TABLE III.- Continued

Wing canard strake: $\delta_N = 10^{\circ}$; $\delta_f = 10^{\circ}$; $C_T = 0.30$

RUN 311

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
12.57	1.2465	-.0230	-.1260	.2993	1.1316	.2534	-.0793
13.94	1.3498	.0286	-.1242	.3014	1.2275	.3041	-.0771
16.01	1.5088	.1225	-.1088	.2995	1.3795	.3917	-.0620
18.14	1.6777	.2328	-.0791	.2998	1.5364	.4972	-.0323
19.99	1.8706	.3405	-.0715	.2995	1.6708	.6000	-.0247
22.05	1.9587	.4647	-.0613	.2995	1.7997	.7185	-.0145
23.93	2.0769	.5863	-.0526	.2995	1.9097	.8348	-.0058
25.90	2.2181	.7319	-.0359	.2987	2.0430	.9739	.0108
27.93	2.2811	.8581	-.0637	.2999	2.0968	1.0967	-.0169
29.93	2.3797	1.0091	-.0368	.2985	2.1887	1.2380	.0098
32.01	2.4618	1.1676	-.0135	.2990	2.2616	1.3898	.0332
33.97	2.5050	1.3046	.0081	.2984	2.2980	1.5196	.0547
35.95	2.5239	1.4423	.0241	.2975	2.3086	1.6505	.0709
37.95	2.5198	1.5677	.0466	.2993	2.2983	1.7675	.0932
40.07	2.5104	1.6997	.0567	.2987	2.2814	1.8916	.1034
23.09	1.9927	.5260	-.1026	.299[illegible]	1.8290	.7770	-.0558
24.02	2.0479	.5844	-.1001	.3005	1.8798	.8335	-.0531
25.08	2.1080	.6535	-.0973	.2998	1.9337	.8989	-.0504
26.07	2.1677	.7239	-.0940	.3004	1.9909	.9667	-.0471
27.05	2.2255	.7969	-.0853	.2998	2.0448	1.0342	-.0384
27.99	2.2772	.8650	-.0740	.2989	2.0932	1.1006	-.0273
28.93	2.3307	.9380	-.0594	.2983	2.1432	1.1701	-.0128
29.95	2.3680	1.0079	-.0454	.2990	2.1760	1.2371	.0014
31.92	2.4571	1.1654	-.0200	.2977	2.2587	1.3869	.0265
34.03	2.5071	1.3149	.0057	.2989	2.2994	1.5294	.0524
35.90	2.5245	1.4404	.0201	.2994	2.3095	1.6488	.0669
22.09	1.9624	.4727	-.0597	.2983	1.8039	.7254	-.0131
21.05	1.8807	.4042	-.0665	.2983	1.7269	.6598	-.0199
20.04	1.8223	.3474	-.0717	.2990	1.6776	.6062	-.0249
18.98	1.7453	.2865	-.0810	.2991	1.6004	.5482	-.0343
21.08	1.8913	.4064	-.0659	.2993	1.7368	.6628	-.0191
23.00	2.0135	.5257	-.0565	.2995	1.8504	.7769	-.0097
25.09	2.1571	.6676	-.0511	.2990	1.9804	.9124	-.0044
26.97	2.2773	.7916	-.0798	.2983	2.0479	1.0294	-.0332
28.97	2.3428	.9451	-.0544	.2982	2.1552	1.1769	-.0078
27.04	2.2332	.7983	-.0786	.2984	2.0534	1.0365	-.0320
25.05	2.0946	.6504	-.0940	.2982	1.9283	.8945	-.0474
23.07	1.9893	.5235	-.1006	.2988	1.8267	.7740	-.0539
21.05	1.8852	.4071	-.1038	.2980	1.7315	.6576	-.0572
19.06	1.7400	.2914	-.0817	.2980	1.6020	.5519	-.0351
17.02	1.5980	.1812	-.0937	.2983	1.4675	.4469	-.0471
15.08	1.4478	.0870	-.1093	.2976	1.3166	.3566	-.0628
12.99	1.2772	-.0033	-.1331	.2991	1.1604	.2720	-.0866

Wing canard strake: $\delta_N = 20^{\circ}$; $\delta_f = 20^{\circ}$; $C_T = 0$

RUN 375

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
-1.86	.3011	.0417	-.2526	0.0000	.3011	.0417	-.2526
-.02	.3953	.0490	-.2373	0.0300	.3953	.0490	-.2373
1.98	.5180	.0641	-.2296	0.0000	.5180	.0641	-.2296
3.99	.6537	.0882	-.2190	0.0000	.6537	.0882	-.2190
5.96	.7876	.1216	-.2047	0.0000	.7876	.1216	-.2047
7.93	.9200	.1638	[illegible]	0.0000	.9200	.1638	-.1916
10.01	1.0459	.2183	-.1636	0.0000	1.0459	.2183	-.1636
11.96	1.1834	.2836	-.1436	0.0000	1.1834	.2836	-.1436
14.10	1.3332	.3646	-.1327	0.0000	1.3332	.3646	-.1327
15.97	1.4571	.4469	-.1126	0.0000	1.4571	.4469	-.1126
18.03	1.5949	.5437	-.0758	0.0000	1.5949	.5437	-.0758
20.10	1.7147	.6495	-.0546	0.0000	1.7147	.6495	-.0546
21.97	1.8278	.7558	-.0372	0.0000	1.8278	.7558	-.0372
23.96	1.9238	.8726	-.0121	0.0000	1.9238	.8726	-.0121
25.87	1.9646	.9722	-.0363	0.0000	1.9646	.9722	-.0363

RUN 306

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
12.63	1.2248	.3084	-.1428	0.0000	1.2248	.3084	-.1428
14.08	1.3231	.3640	-.1353	0.0000	1.3231	.3640	-.1353
15.99	1.4549	.4483	-.1160	0.0000	1.4549	.4483	-.1160
18.07	1.5907	.5455	-.0778	0.0000	1.5907	.5455	-.0778
20.05	1.7216	.6543	-.0584	0.0000	1.7216	.6543	-.0584
22.04	1.8248	.7621	-.0364	0.0000	1.8248	.7621	-.0364
24.03	1.9340	.8823	-.0086	0.0000	1.9340	.8823	-.0086
26.06	1.9730	.9870	-.0278	0.0000	1.9730	.9870	-.0278
27.95	2.0525	1.1107	.0014	0.0000	2.0575	1.1107	.0014
30.03	2.1145	1.2423	.0417	0.0000	2.1145	1.2423	.0417
31.95	2.1550	1.3621	.0760	0.0000	2.1550	1.3621	.0760
33.96	2.1646	1.4749	.1086	0.0000	2.1646	1.4749	.1086
36.00	2.1465	1.5785	.1367	0.0000	2.1465	1.5785	.1367
37.95	2.1027	1.6620	.1584	0.0000	2.1027	1.6620	.1584
39.94	2.0401	1.7345	.1815	0.0000	2.0401	1.7345	.1815

TABLE III.- Continued

Wing canard strake: δ_N = 20°; δ_f = 20°; C_T = 0.20

RUN 376

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.90	.4090	-.1542	-.3357	.1965	.3440	.0326	-.2753
.09	.5246	-.1422	-.3269	.1973	.4369	.0431	-.2662
1.96	.6525	-.1230	-.3263	.1975	.5676	.0602	-.2655
3.98	.8020	-.0910	-.3215	.1961	.7274	.0881	-.2612
5.96	.9630	-.0504	-.3152	.1970	.8767	.1267	-.2546
8.04	1.1128	.0028	-.3053	.1973	1.0200	.1769	-.2445
9.95	1.2334	.0613	-.2817	.1962	1.1355	.2312	-.2213
12.10	1.3956	.1422	-.2696	.1966	1.2912	.3088	-.2091
14.04	1.5486	.2267	-.2630	.1968	1.4384	.3899	-.2024
15.97	1.6888	.3200	-.2506	.1972	1.5730	.4796	-.1899
17.96	1.8282	.4242	-.2221	.1970	1.7071	.5796	-.1614
19.99	1.9660	.5435	-.2063	.1973	1.8392	.6967	-.1455
21.96	2.0978	.6896	-.1941	.1977	1.9640	.8163	-.1336
23.93	2.2146	.8026	-.1798	.1973	2.0777	.9447	-.1191
25.93	2.3119	.9382	-.1833	.1975	2.1700	1.0756	-.1225

RUN 307

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.66	1.4421	.1697	-.2669	.1968	1.3359	.3354	-.2063
14.11	1.5537	.2327	-.2561	.1970	1.4437	.3958	-.1955
15.95	1.6919	.3225	-.2410	.1969	1.5763	.4819	-.1805
18.10	1.8446	.4375	-.2248	.1969	1.7231	.5925	-.1642
20.10	1.9815	.5562	-.2057	.1960	1.8555	.7062	-.1453
22.04	2.1057	.6793	-.1919	.1961	1.9744	.8249	-.1315
24.07	2.2198	.8139	-.1804	.1965	2.0877	.9551	-.1199
26.02	2.2733	.9317	-.2065	.1962	2.1371	1.0679	-.1461
27.97	2.3653	1.0720	-.1873	.1976	2.2185	1.2042	-.1265
29.99	2.4486	1.2247	-.1532	.1970	2.2979	1.3514	-.0926
31.98	2.5100	1.3723	-.1236	.1972	2.3547	1.4938	-.0629
33.92	2.5360	1.5055	-.0997	.1975	2.3771	1.6218	-.0389
35.91	2.5398	1.6357	-.0762	.1966	2.3770	1.7456	-.0157
37.93	2.5275	1.7606	-.0512	.1967	2.3609	1.8650	.0093
39.94	2.4869	1.8694	-.0351	.1966	2.3157	1.9679	.0254

Wing canard strake: δ_N = 20°; δ_f = 20°; C_T = 0.30

RUN 377

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.90	.4376	-.2572	-.3644	.3001	.3444	.0291	-.2720
.03	.5482	-.2440	-.3531	.3006	.4493	.0386	-.2605
2.07	.7046	-.2200	-.3541	.2992	.5977	.0573	-.2620
4.01	.8697	-.1897	-.3523	.2999	.7266	.0847	-.2606
5.98	1.0132	-.1465	-.3462	.2992	.8871	.1244	-.2541
7.98	1.1611	-.0924	-.3375	.2985	1.0206	.1721	-.2453
9.95	1.2891	-.0303	-.3172	.2995	1.1395	.2291	-.2250
12.09	1.4567	.0517	-.3032	.2999	1.2974	.3058	-.2109
14.08	1.6220	.1460	-.2971	.2980	1.4550	.3978	-.2056
16.00	1.7653	.2421	-.2857	.2986	1.5898	.4936	-.1938
16.08	1.7709	.2467	-.2853	.2981	1.5953	.4972	-.1935
18.04	1.9196	.3539	-.2542	.2993	1.7351	.5996	-.1621
19.96	2.0982	.4684	-.2404	.2990	1.8582	.6975	-.1484
21.97	2.1878	.5995	-.2313	.2994	1.9877	.8222	-.1392

RUN 308

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.52	1.4903	.0735	-.3101	.2987	1.3297	.3256	-.2181
14.01	1.6125	.1417	-.3033	.3001	1.4447	.3900	-.2110
15.95	1.7601	.2396	-.2896	.2992	1.5845	.4818	-.1973
17.97	1.9089	.3517	-.2636	.2976	1.7258	.5863	-.1720
19.97	2.0621	.4767	-.2470	.2984	1.8711	.7056	-.1551
22.04	2.1816	.6048	-.2319	.2976	1.9823	.8258	-.1403
24.00	2.3001	.7391	-.2193	.2982	2.0950	.9536	-.1275
25.97	2.4237	.8871	-.2050	.2982	2.2093	1.0943	-.1132
27.96	2.4658	1.0124	-.2269	.2981	2.2449	1.2121	-.1351
29.96	2.5627	1.1722	-.1942	.2983	2.3344	1.3642	-.1024
31.96	2.6283	1.3296	-.1679	.2977	2.3939	1.5131	-.0762
33.92	2.6587	1.4712	-.1433	.2981	2.4179	1.6468	-.0516
35.98	2.6644	1.6117	-.1249	.2974	2.4178	1.7782	-.0333
38.01	2.6560	1.7438	-.0993	.2977	2.4035	1.9033	-.0077
40.03	2.6232	1.8694	-.0869	.2977	2.3653	2.0180	.0047

TABLE III.- Continued

Wing canard strake: $\delta_N = 30^o$; $\delta_f = 30^o$; $C_T = 0$

RUN 378

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
-1.96	.3732	.0686	-.3029	0.0000	.3732	.0686	-.3029
-.01	.4824	.0798	-.2947	0.0000	.4824	.0798	-.2947
1.99	.5968	.0965	-.2845	0.0000	.5968	.0965	-.2845
4.16	.7441	.1252	-.2708	0.0000	.7441	.1252	-.2708
6.01	.8686	.1593	-.2577	0.0000	.8686	.1593	-.2577
7.97	.9954	.2042	-.2409	0.0000	.9954	.2042	-.2409
10.01	1.1258	.2679	-.2186	0.0000	1.1258	.2679	-.2186
12.11	1.2740	.3429	-.2050	0.0000	1.2740	.3429	-.2050
13.95	1.4037	.4166	-.1938	0.0000	1.4037	.4166	-.1938
16.03	1.5377	.5085	-.1746	0.0000	1.5377	.5085	-.1746
18.09	1.6608	.6049	-.1338	0.0000	1.6608	.6049	-.1338
19.95	1.7631	.7029	-.1097	0.0000	1.7631	.7029	-.1097
22.07	1.8765	.8225	-.0799	0.0000	1.8765	.8225	-.0799
24.08	1.9677	.9398	-.0550	0.0000	1.9677	.9398	-.0550
25.92	1.9990	1.0226	-.0708	0.0000	1.9990	1.0226	-.0708

RUN 303

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
12.74	1.3086	.3638	-.1909	0.0000	1.3086	.3638	-.1909
13.91	1.3885	.4110	-.1880	0.0000	1.3885	.4110	-.1880
16.05	1.5283	.5056	-.1702	0.0000	1.5283	.5056	-.1702
17.95	1.6506	.5982	-.1327	0.0000	1.6506	.5982	-.1327
20.01	1.7617	.7031	-.1020	0.0000	1.7617	.7031	-.1020
21.97	1.8578	.8112	-.0738	0.0000	1.8578	.8112	-.0738
24.02	1.9550	.9314	-.0459	0.0000	1.9550	.9314	-.0459
26.07	1.9993	1.0371	-.0658	0.0000	1.9993	1.0371	-.0658
28.08	2.0637	1.1665	-.0322	0.0000	2.0637	1.1665	-.0322
29.95	2.1198	1.2997	.0065	0.0000	2.1198	1.2997	.0065
31.96	2.1438	1.4049	.0420	0.0000	2.1438	1.4049	.0420
33.95	2.1474	1.5109	.0798	0.0000	2.1474	1.5109	.0798
36.00	2.1119	1.6035	.1033	0.0000	2.1119	1.6035	.1033
37.94	2.0558	1.6735	.1335	0.0000	2.0558	1.6735	.1335
39.94	1.9949	1.7424	.1608	0.0000	1.9949	1.7424	.1608

Wing canard strake: $\delta_N = 30^o$; $\delta_f = 30^o$; $C_T = 0.20$

RUN 379

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
-1.01	.5461	-.1114	-.4434	.1968	.4576	.0622	-.3549
.07	.6948	-.0934	-.4430	.1975	.5898	.0775	-.3549
2.08	.8288	-.0672	-.4412	.1969	.7244	.0907	-.3526
4.04	.9655	-.0316	-.4297	.1967	.8556	.1316	-.3512
6.11	1.1308	.0185	-.4344	.1972	1.0144	.1778	-.3457
7.93	1.2513	.0708	-.4182	.1968	1.1309	.2261	-.3296
10.10	1.3911	.1460	-.3954	.1973	1.2640	.2970	-.3066
11.97	1.5493	.2272	-.3900	.1972	1.4116	.3738	-.3013
14.08	1.6966	.3272	-.3862	.1964	1.5600	.4683	-.2979
15.96	1.8491	.4287	-.3860	.1964	1.7078	.5664	-.2975
18.01	2.0019	.5486	-.3565	.1971	1.8595	.6806	-.2678
19.98	2.1372	.6721	-.3373	.1961	1.9870	.7982	-.2490
21.99	2.2466	.7983	-.3187	.1965	2.0916	.9192	-.2303
23.96	2.3376	.9258	-.2996	.1965	2.1798	1.0414	-.2110
26.07	2.3934	1.0549	-.3022	.1967	2.2307	1.1667	-.2137

RUN 304

ALPHA	CL	CD	CM	CT	CLF	CDI	CMI
12.48	1.5763	.2523	-.3966	.1967	1.4435	.3974	-.2981
14.09	1.7003	.3318	-.3654	.1968	1.5636	.4732	-.2968
16.09	1.8606	.4410	-.3797	.1963	1.7190	.5771	-.2914
17.98	2.0003	.5501	-.3557	.1965	1.8543	.6816	-.2672
20.06	2.1296	.6735	-.3253	.1960	1.9786	.7994	-.2372
22.09	2.2345	.8001	-.3013	.1958	2.0800	.9206	-.2132
24.00	2.3326	.9276	-.2830	.1974	2.1779	1.0435	-.1942
25.96	2.4138	1.0616	-.2637	.1969	2.2508	1.1719	-.1751
27.98	2.4586	1.1968	-.2932	.1964	2.2971	1.3010	-.2049

TABLE III.- Concluded

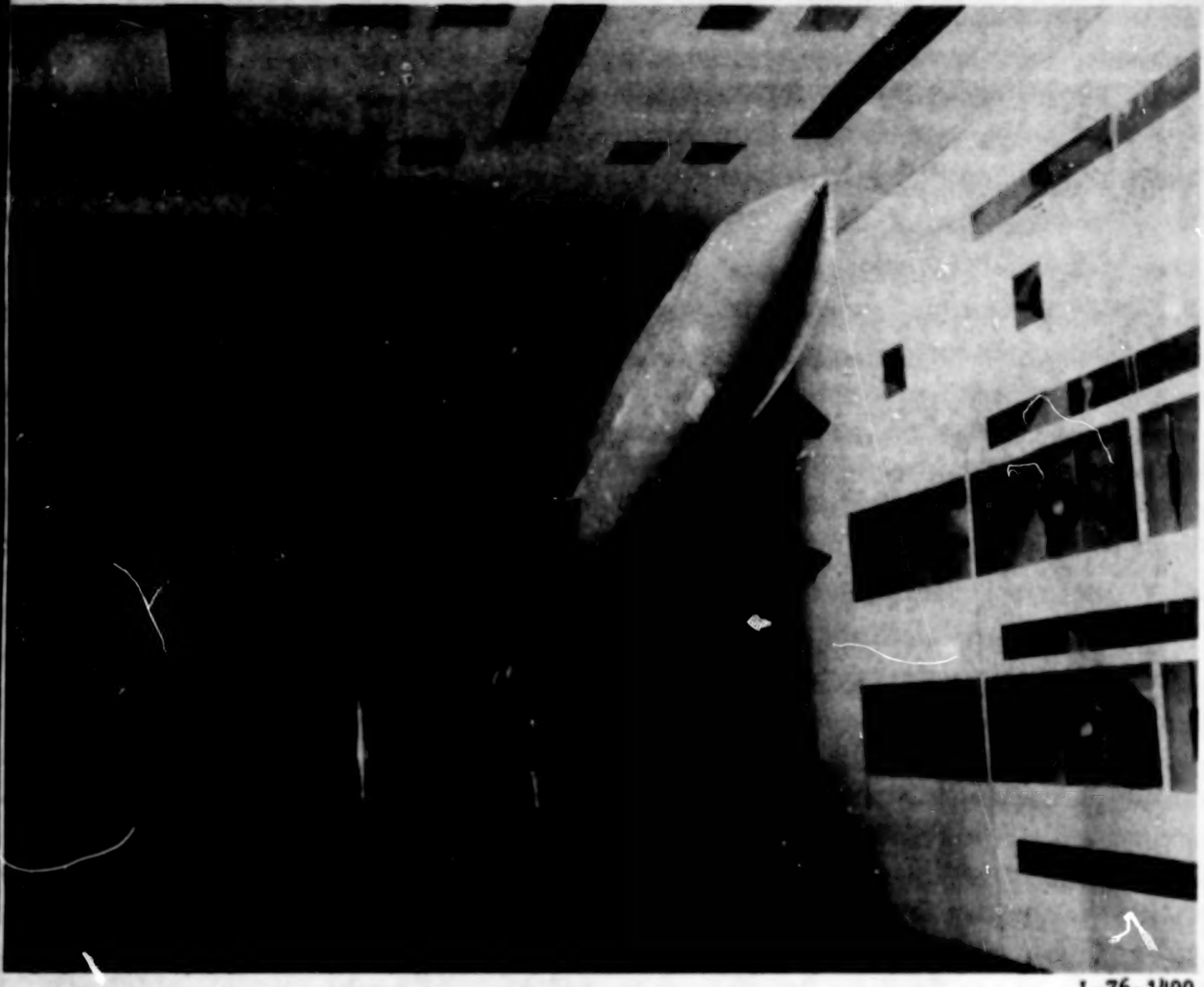
Wing canard strake: $\delta_N = 30^o$; $\delta_f = 30^o$; $C_T = 0.30$

RUN 390

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
-1.89	.5889	-.2064	-.4566	.2981	.4494	.0505	-.3343
.03	.7317	-.1871	-.4463	.2987	.5877	.0711	-.3408
2.07	.8776	-.1578	-.4481	.2985	.7185	.0951	-.3537
3.99	1.0278	-.1263	-.4482	.2984	.8688	.1271	-.3530
6.00	1.1955	-.0698	-.4431	.2988	1.0193	.1727	-.3482
8.02	1.3236	-.0095	-.4673	.2982	1.1389	.2235	-.3281
10.09	1.4840	.0441	-.4471	.2991	1.2748	.2856	-.3125
12.07	1.6138	.1478	-.4378	.3001	1.4198	.3707	-.3028
14.01	1.7725	.2305	-.4361	.2988	1.5648	.4455	-.3018
16.00	1.7558	.2475	-.4368	.2988	1.5527	.4625	-.3023
16.07	1.9354	.3650	-.4309	.2985	1.7205	.5771	-.2965
17.98	2.0866	.4832	-.4060	.2988	1.8748	.6832	-.2716
20.03	2.2419	.6162	-.3927	.2979	2.0198	.8078	-.2587
21.93	2.3503	.7400	-.3807	.2975	2.1148	.9243	-.2468
23.97	2.4588	.8817	-.3582	.2975	2.2187	1.0582	-.2254
25.94	2.5462	1.0199	-.3343	.2976	2.2986	1.1887	-.2062

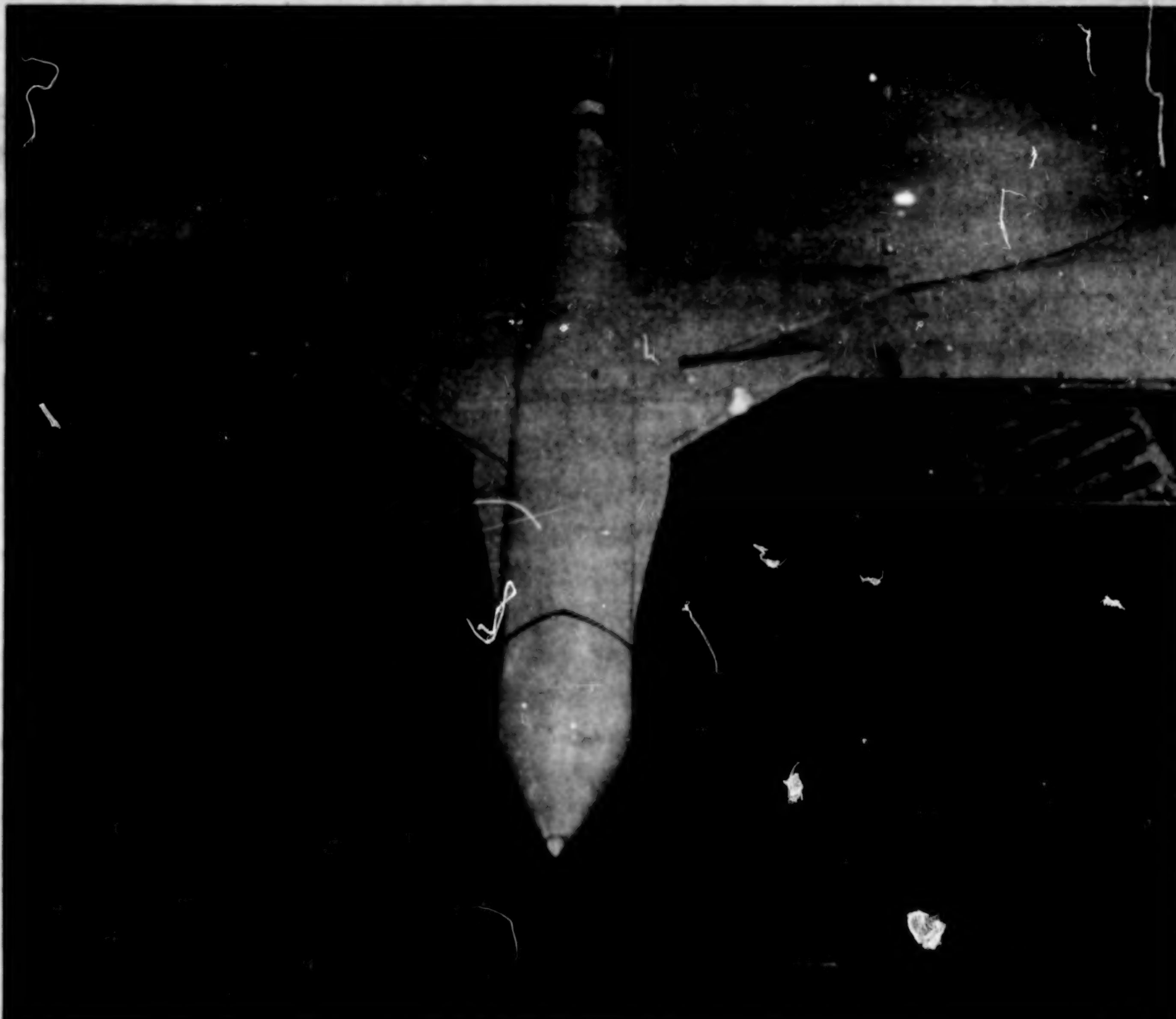
RUN 393

ALPHA	CL	CD	CM	CT	CLF	CDF	CMF
12.36	1.6586	.1730	-.4396	.2980	1.4577	.3939	-.3009
14.01	1.7832	.2376	-.4300	.2973	1.5767	.4708	-.2976
16.10	1.9627	.3760	-.4260	.2985	1.7477	.5819	-.2925
17.96	2.1039	.4856	-.4050	.2979	1.8828	.6851	-.2700
20.08	2.2837	.6238	-.3943	.2980	2.0398	.8102	-.2596
21.92	2.3715	.7473	-.3736	.2982	2.1340	.9519	-.2387
23.96	2.4711	.8841	-.3513	.2986	2.2280	1.0603	-.2164
26.09	2.5811	1.0339	-.3236	.2982	2.3178	1.2000	-.1989
27.97	2.5905	1.1577	-.3376	.2981	2.3368	1.3158	-.2228
30.09	2.6606	1.3178	-.3286	.2980	2.4008	1.4667	-.1936
31.96	2.6890	1.4940	-.3073	.2985	2.4303	1.5990	-.1729
33.96	2.7284	1.6026	-.2052	.2987	2.4590	1.7330	-.1508
35.96	2.7467	1.7516	-.2661	.2985	2.4777	1.8732	-.1318
37.92	2.7223	1.8754	-.2319	.2981	2.4461	1.9874	-.0977
39.94	2.6803	1.9924	-.1911	.2985	2.3990	2.0591	-.0314



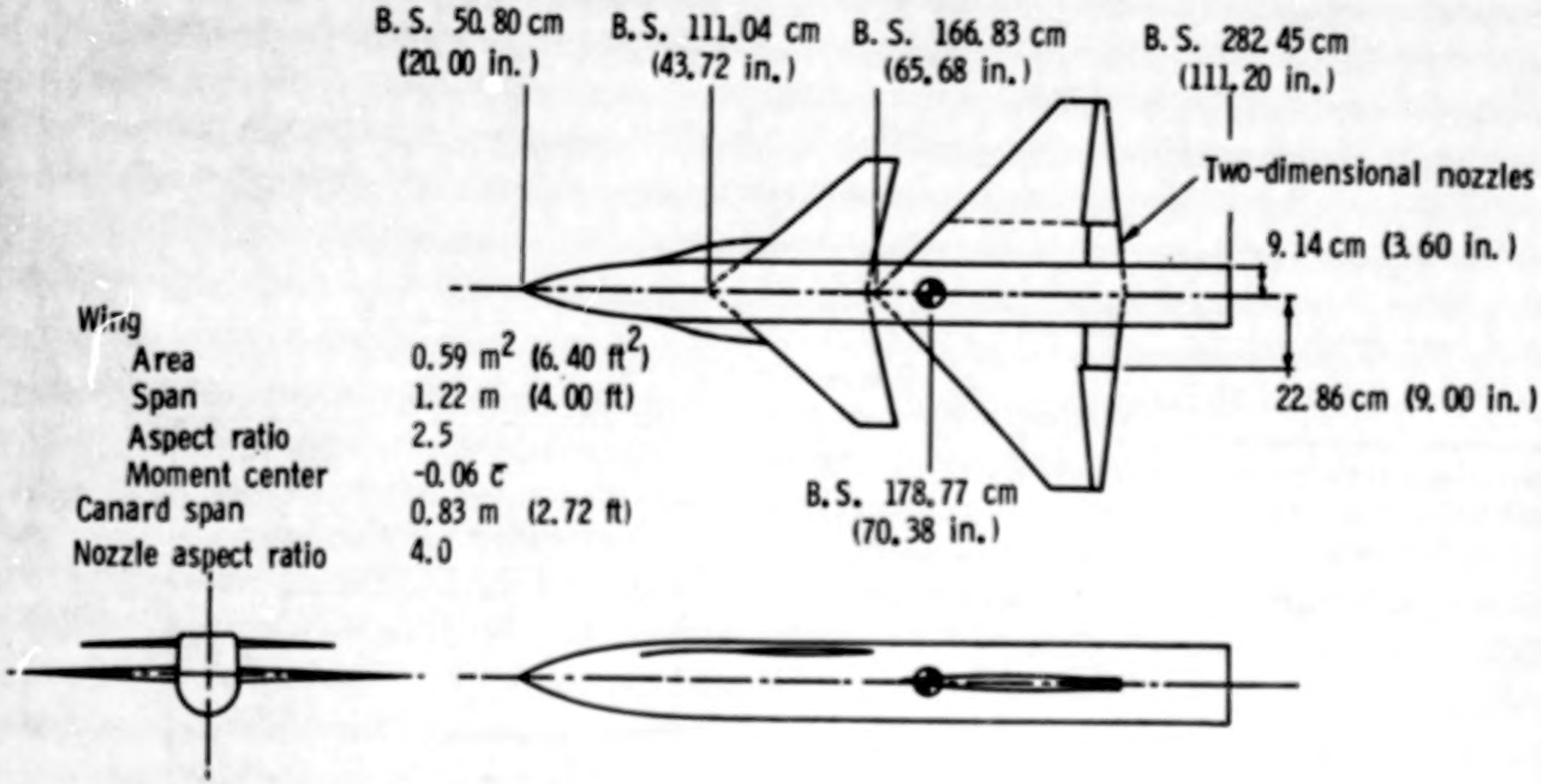
L-76-1499

Figure 1.- Model installed in Langley V/STOL tunnel.



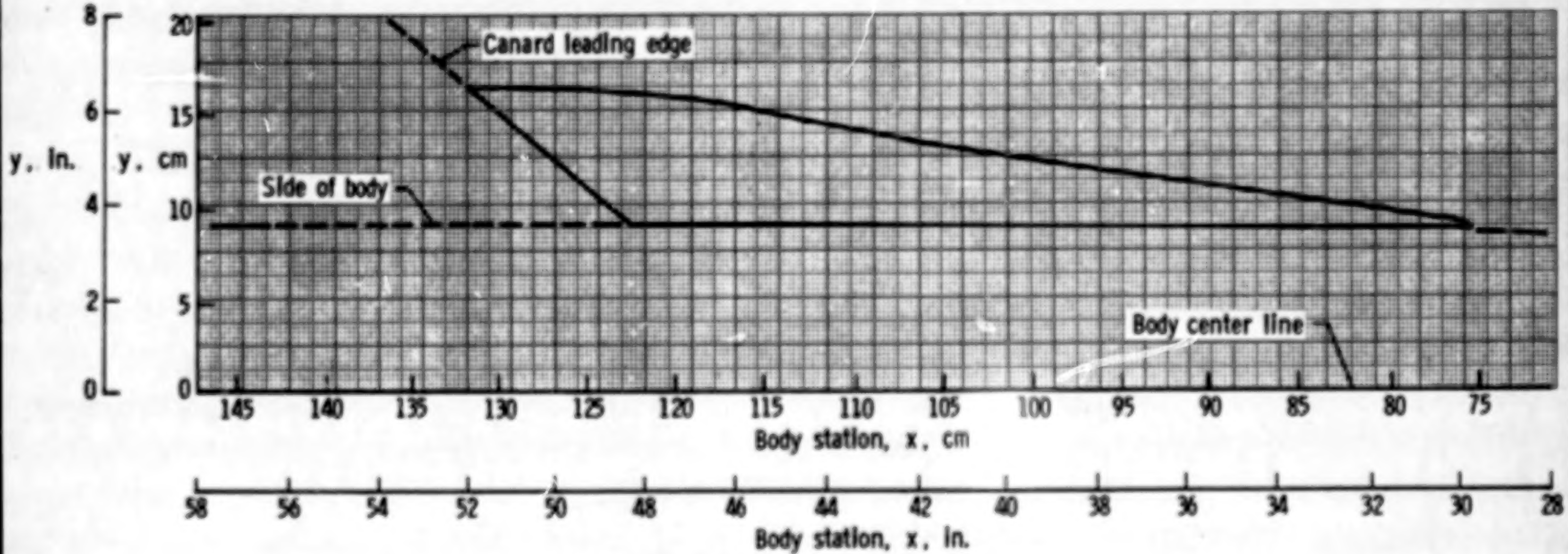
L-76-1498

Figure 2.- Top view of model in Langley V/STOL tunnel.



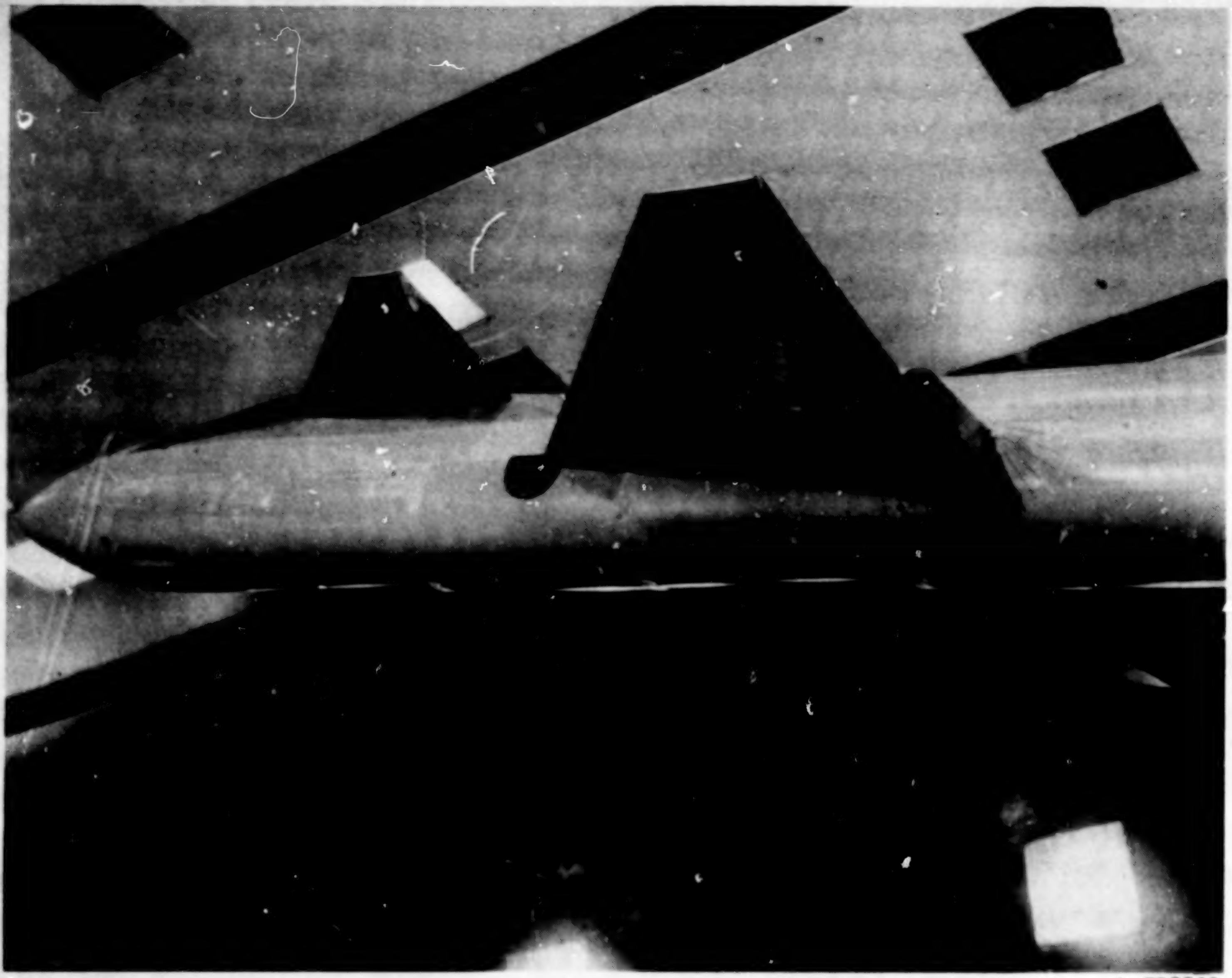
(a) Three-view sketch of model.

Figure 3.- Model geometry. B.S. denotes body station in cm (in.).



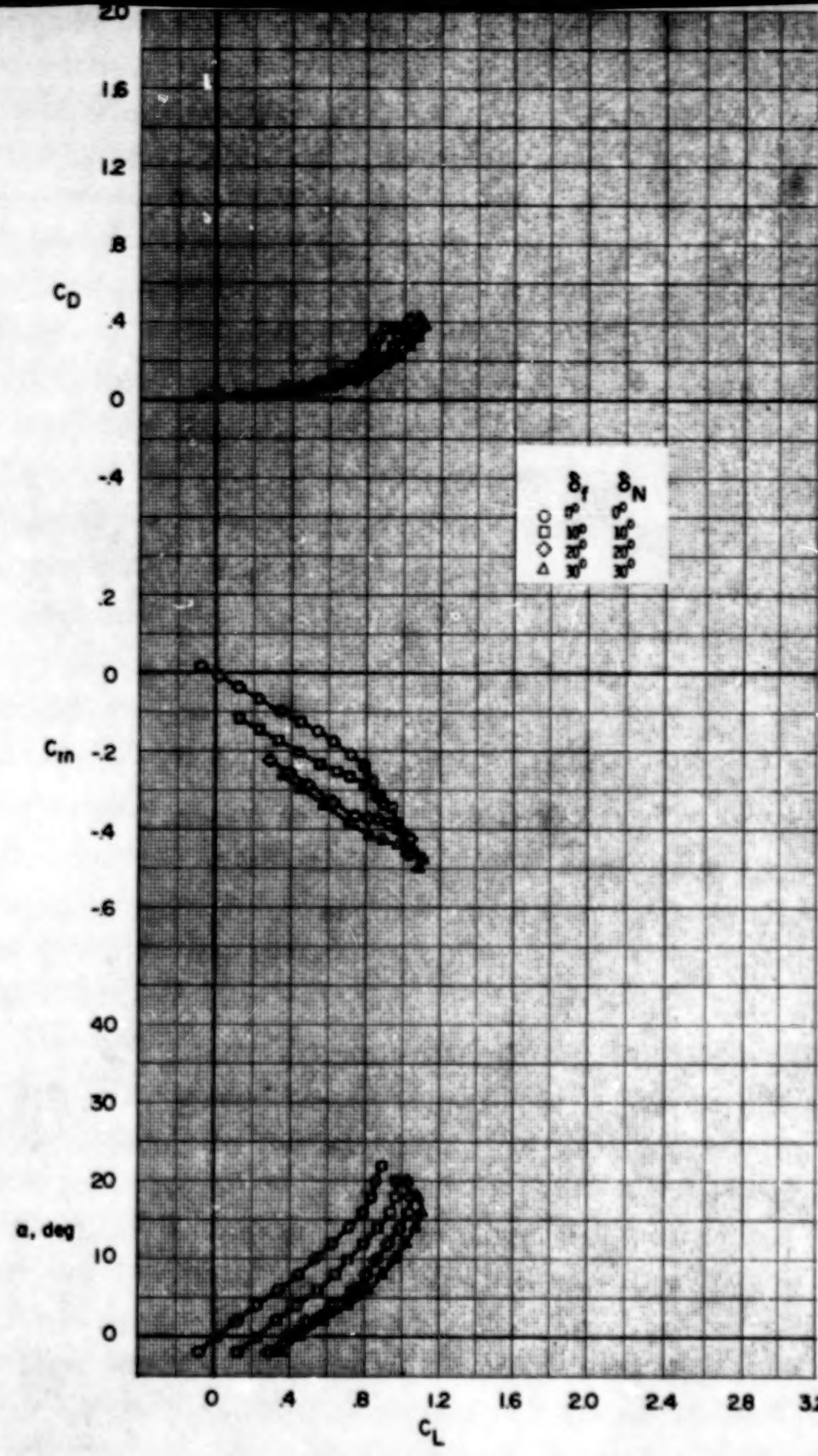
(b) Strake geometry.

Figure 3.- Concluded.



L-7"2219

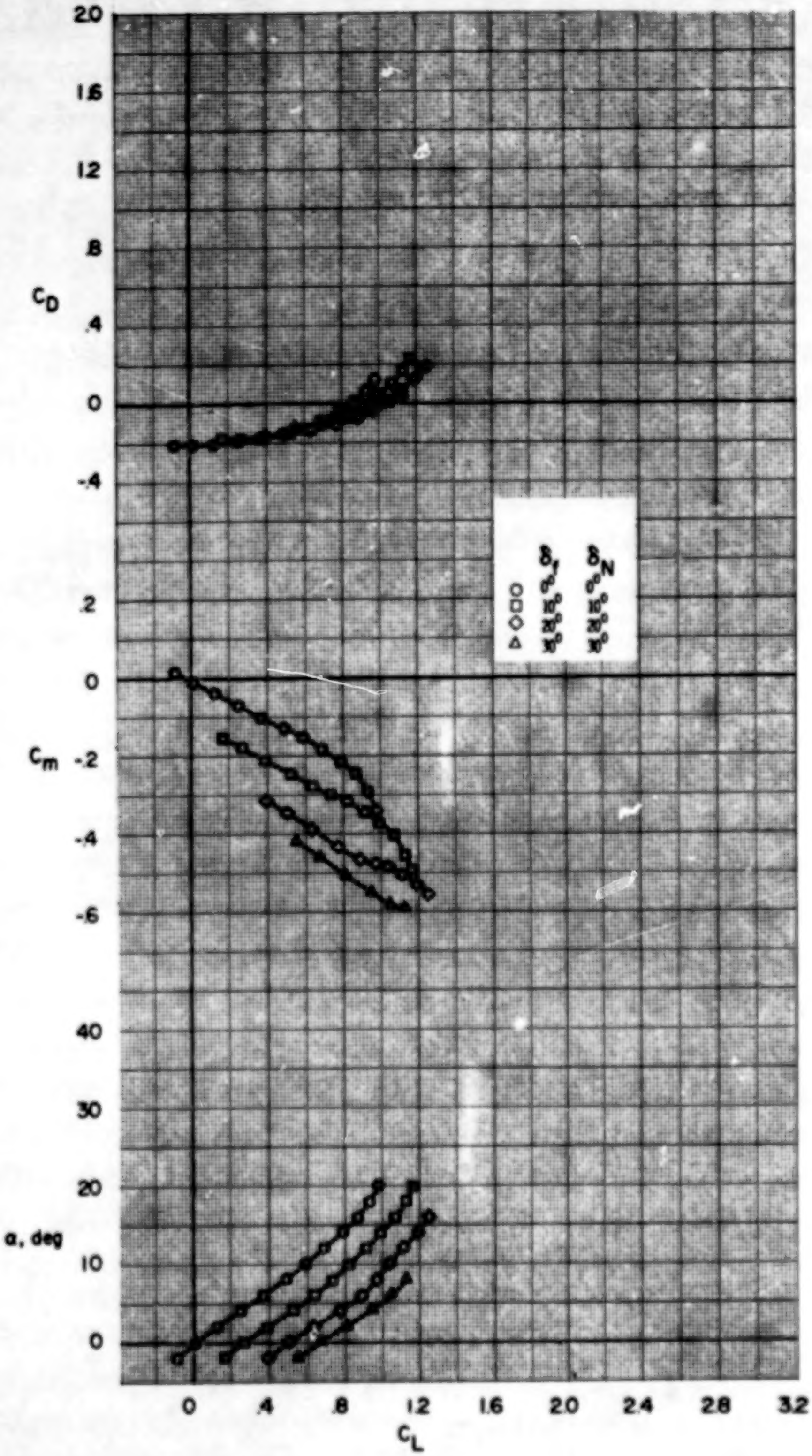
Figure 4.- View of model showing trailing-edge flaps and two-dimensional nozzles deflected.



(a) $C_T = 0$.

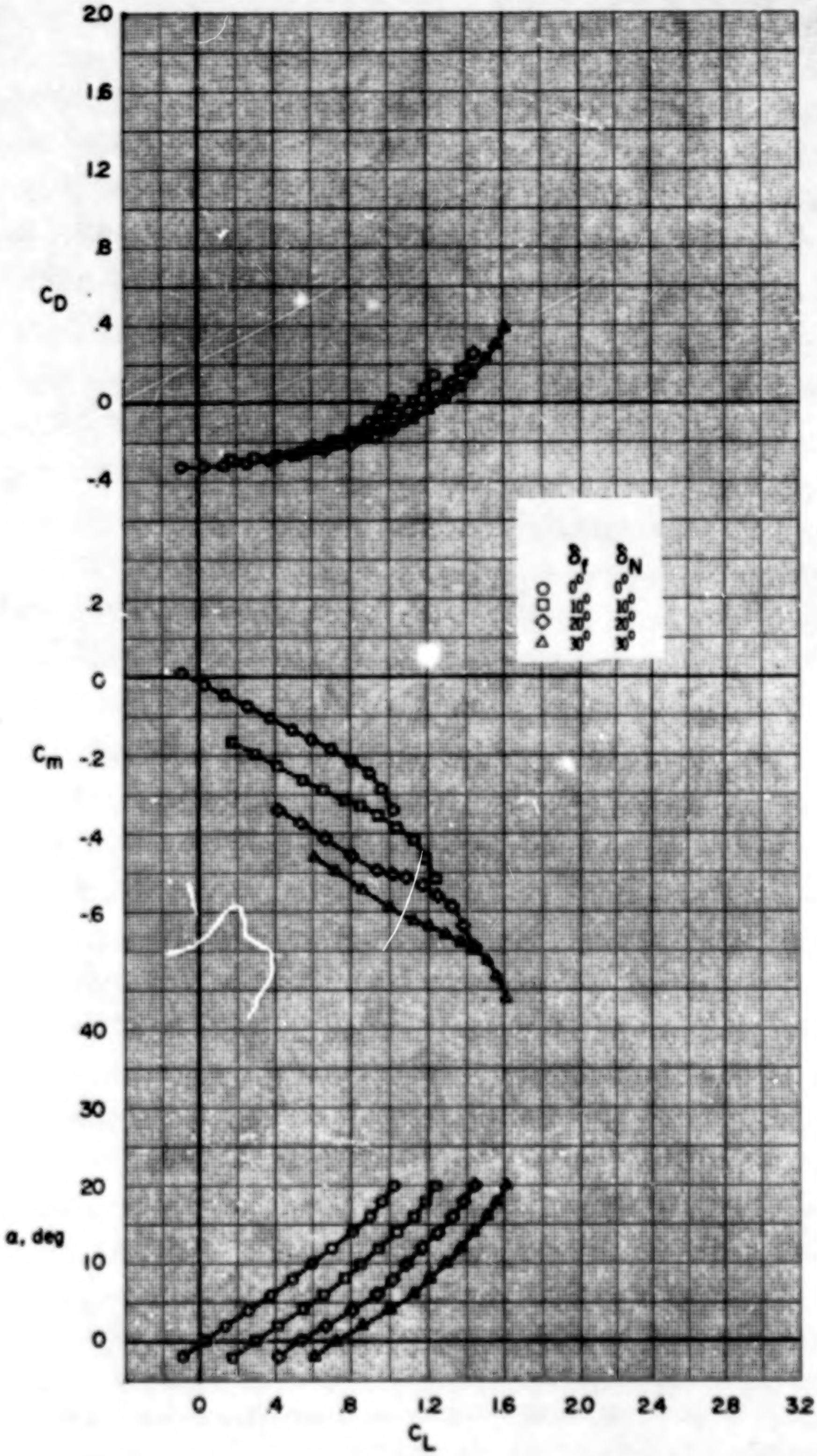
42.

Figure 5.- Effect of nozzle and flap deflection on longitudinal aerodynamic characteristics of wing-alone configuration at various thrust coefficients.



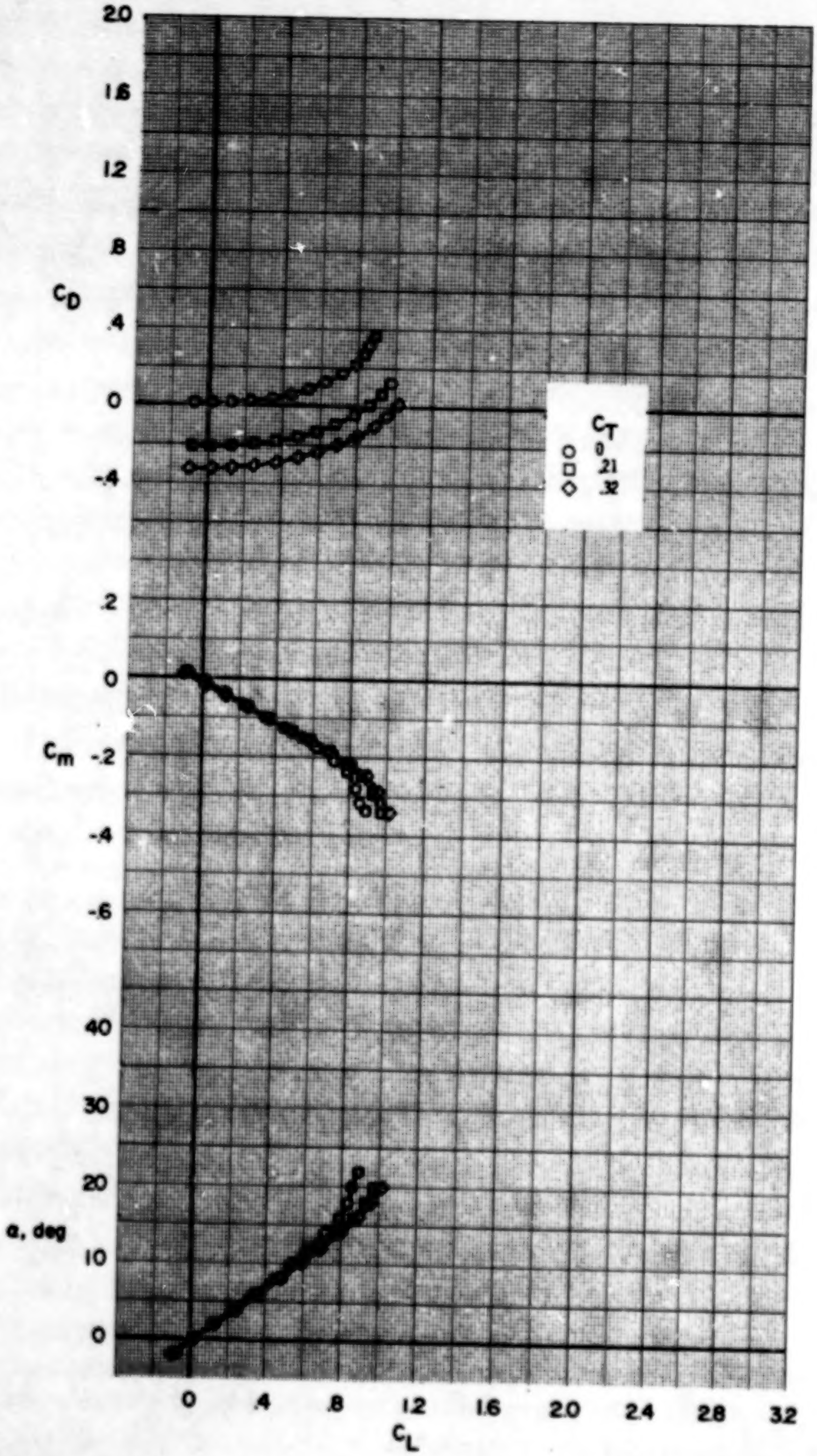
(b) $C_T = 0.21$.

Figure 5.- Continued.



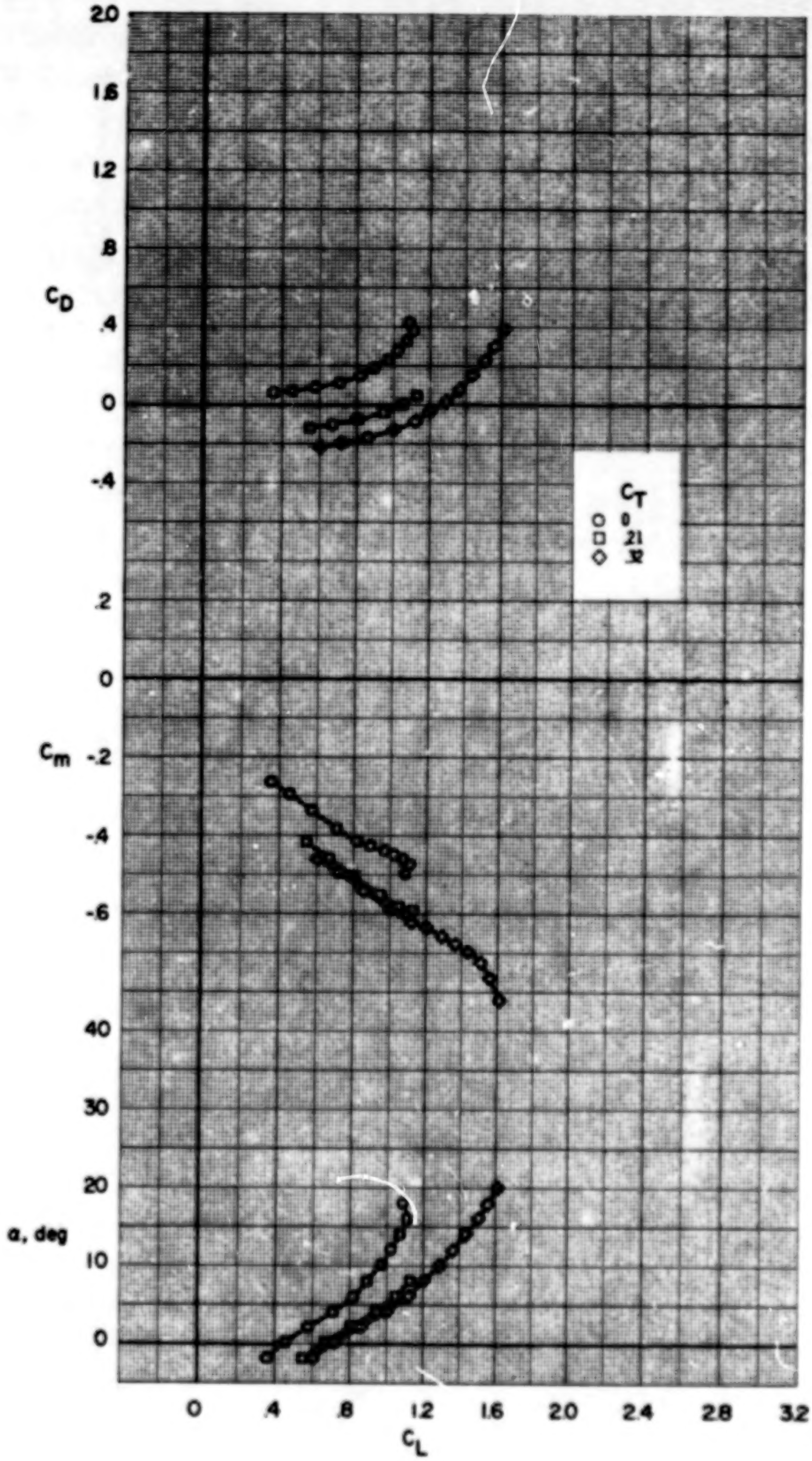
(c) $C_T = 0.32$.

Figure 5.- Concluded.



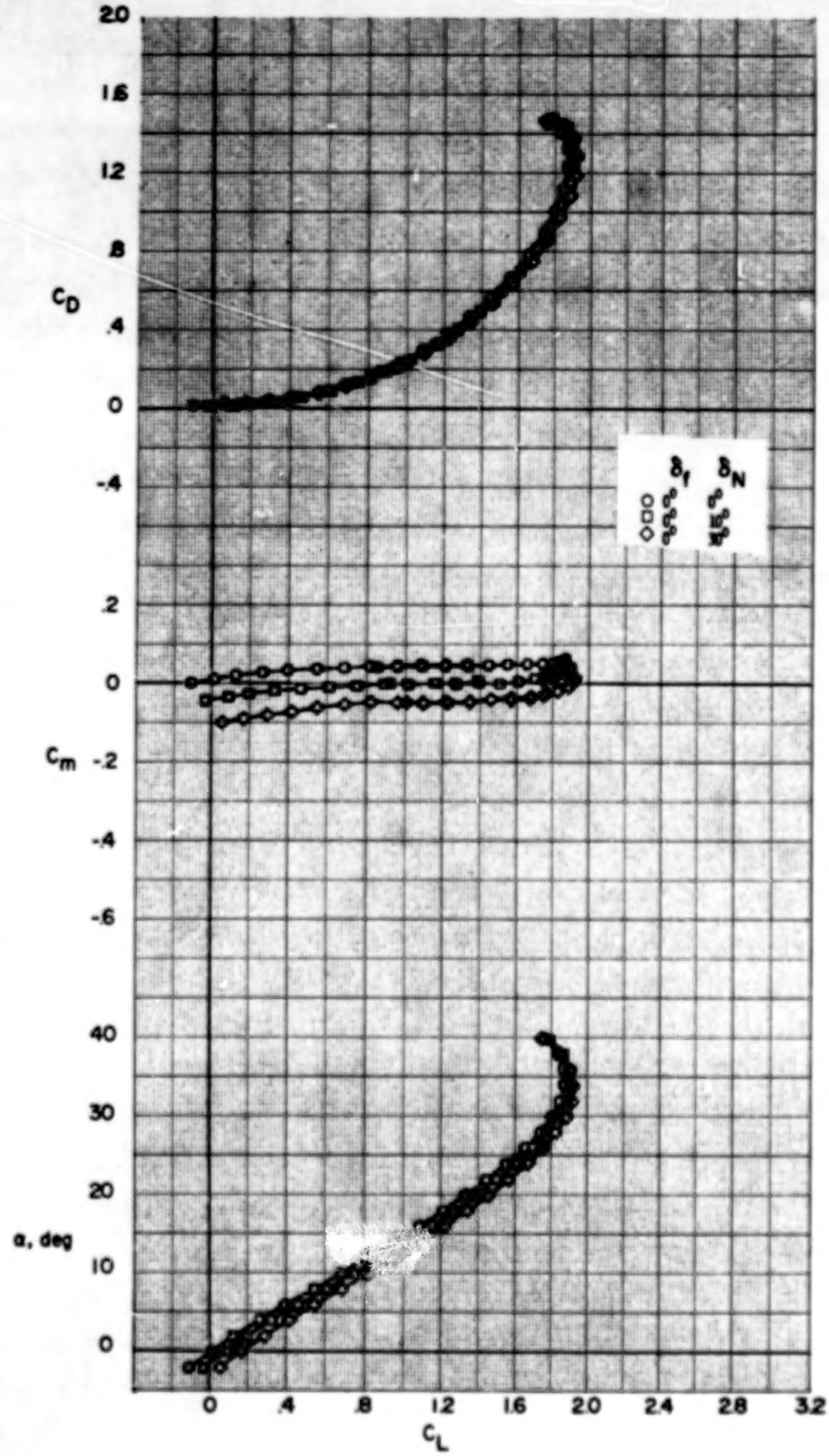
(a) $\delta_N = \delta_f = 0^\circ$.

Figure 6.- Effect of thrust coefficient on longitudinal aerodynamic characteristics of wing-alone configuration with various nozzle and flap deflections.



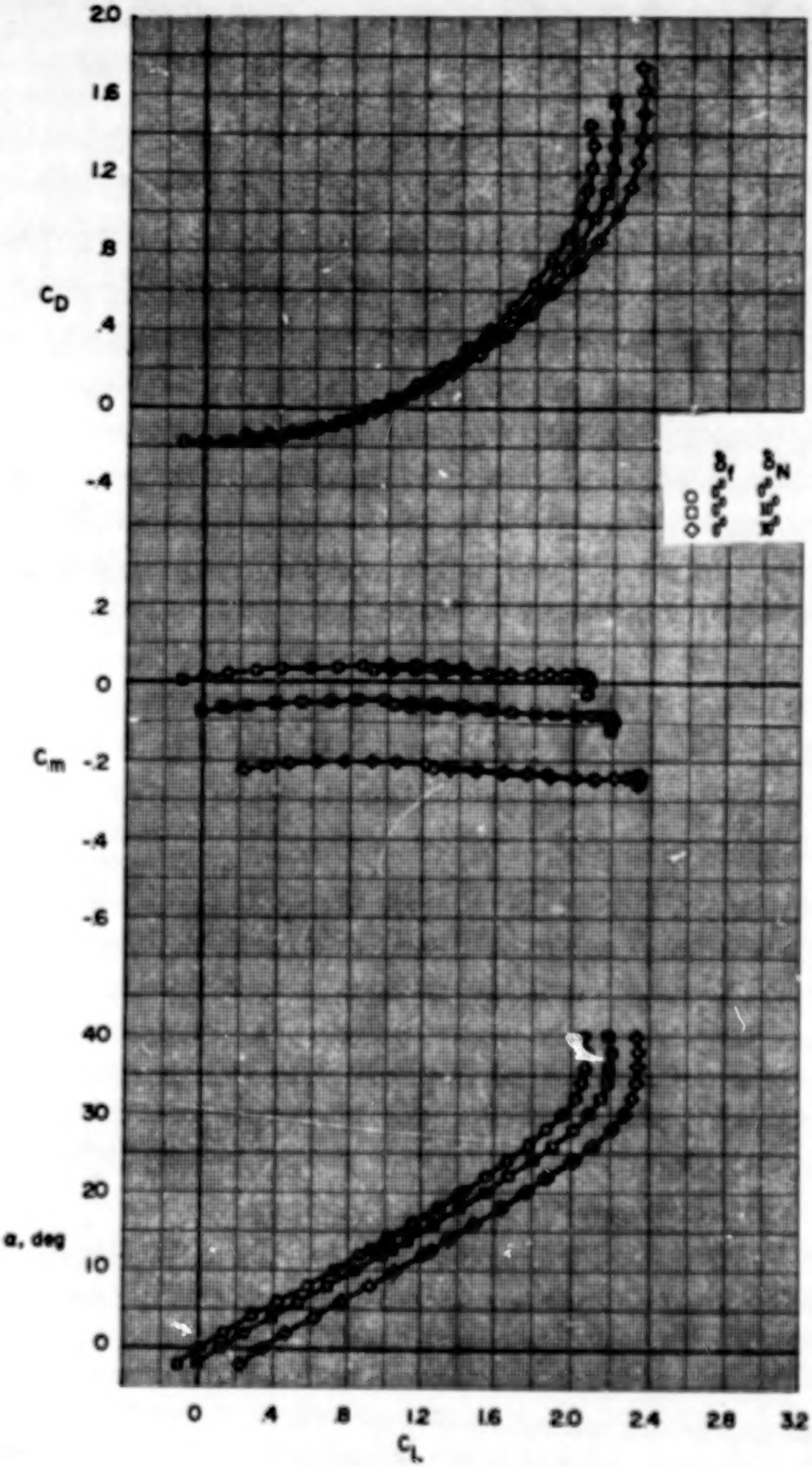
(b) $\delta_N = \delta_f = 30^\circ$.

Figure 6.- Concluded.



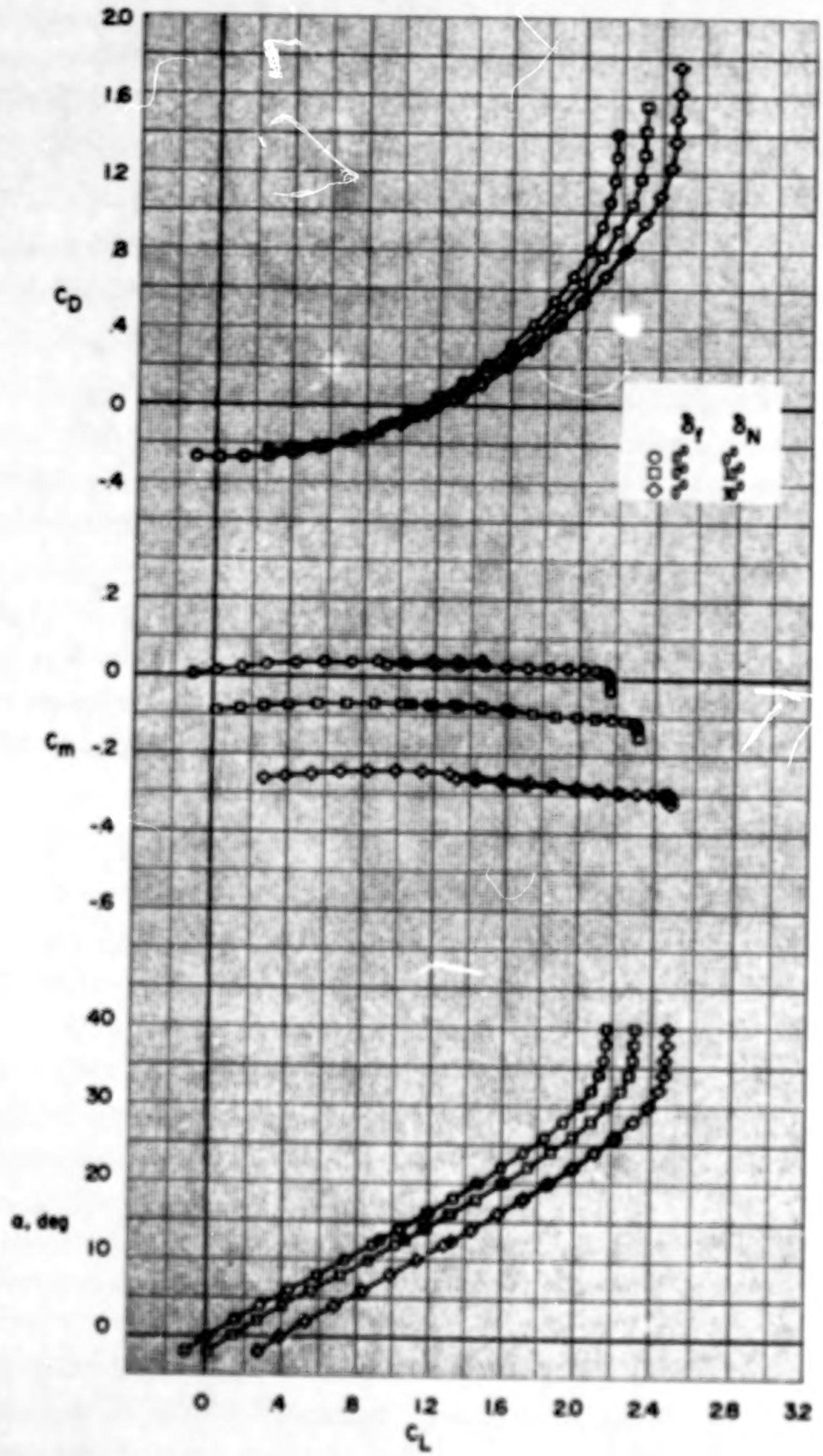
(a) $C_T = 0$.

Figure 7.- Effect of nozzle deflection on longitudinal aerodynamic characteristics of wing-canard configuration at various thrust coefficients.



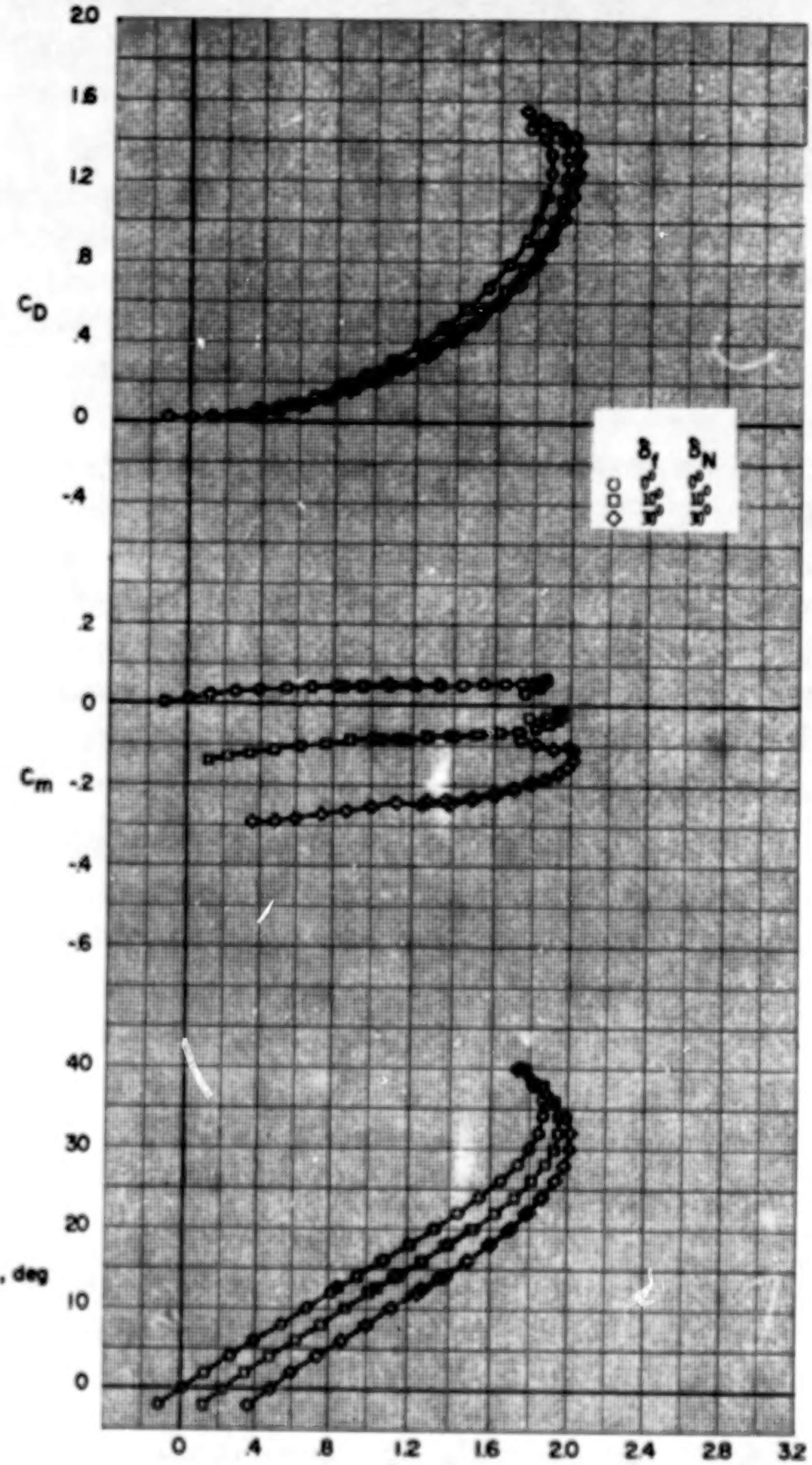
(b) C_T = 0.20.

Figure 7.- Continued.



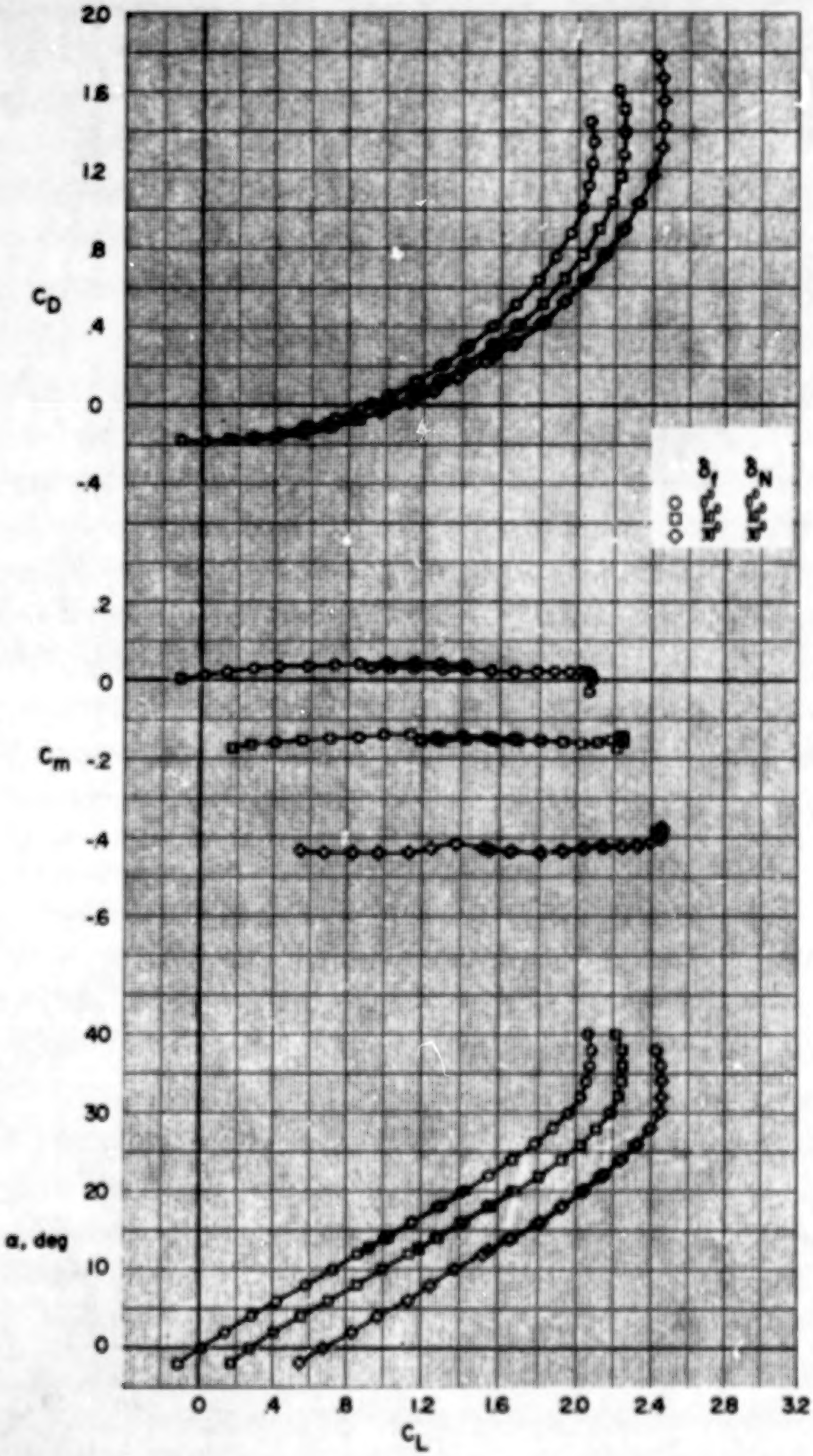
(c) $C_T = 0.30$.

Figure 7.- Concluded.



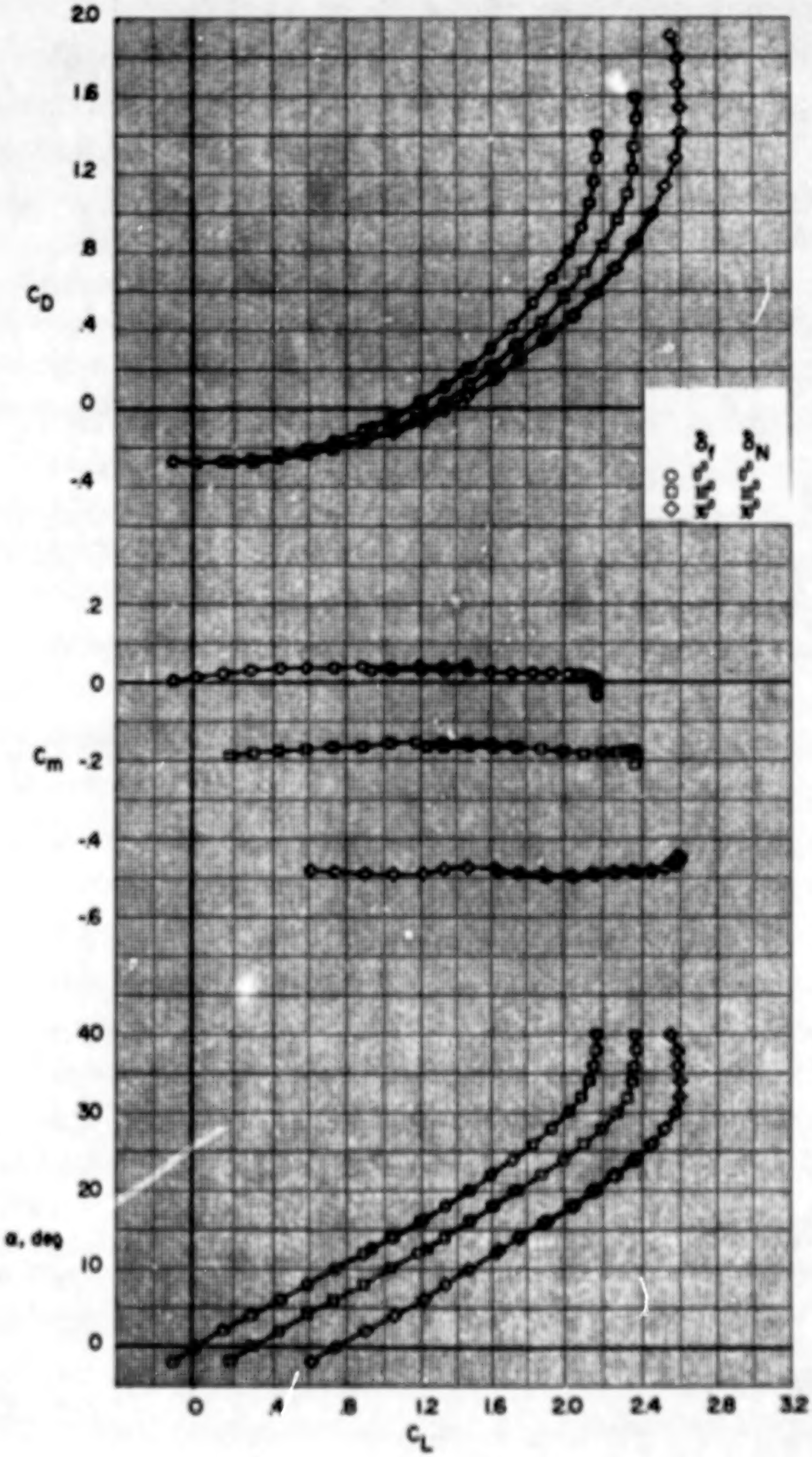
(a) $C_T = 0$.

Figure 8.- Effect of nozzle and flap deflection on longitudinal aerodynamic characteristics of wing-canard configuration at various thrust coefficients.



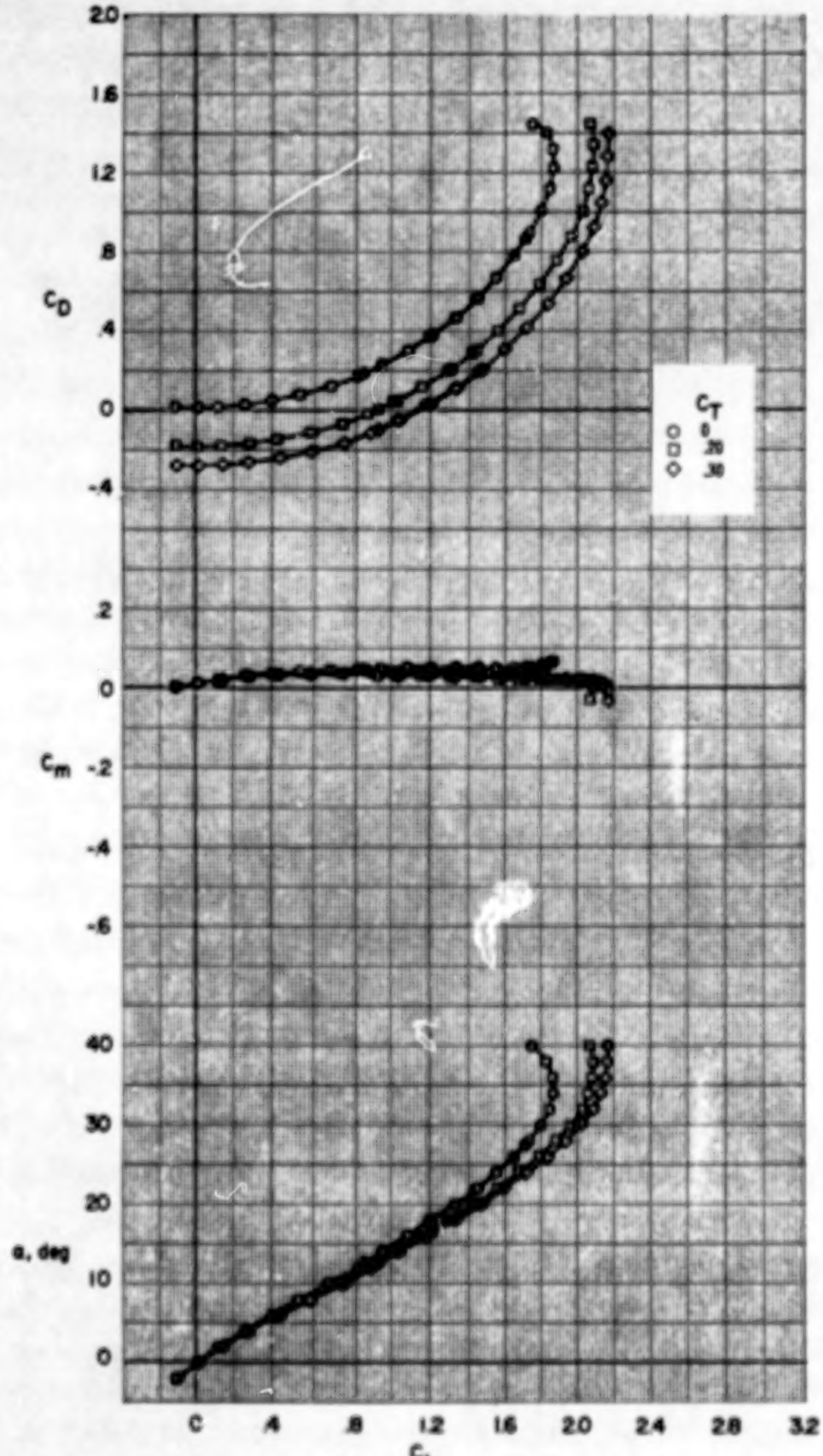
(b) $C_T = 0.20$.

Figure 8.- Continued.



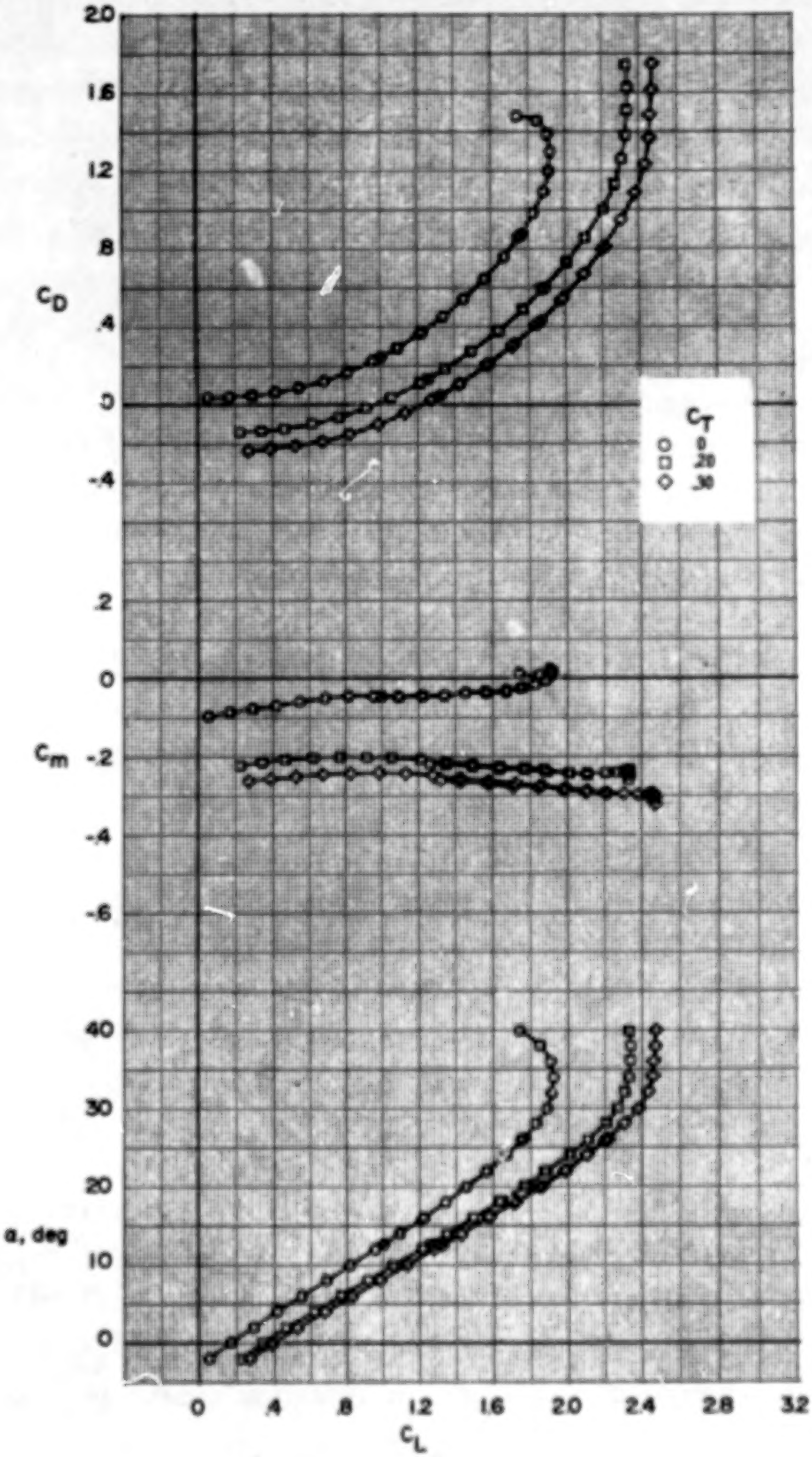
(c) C_T = 0.30.

Figure 8.- Concluded.



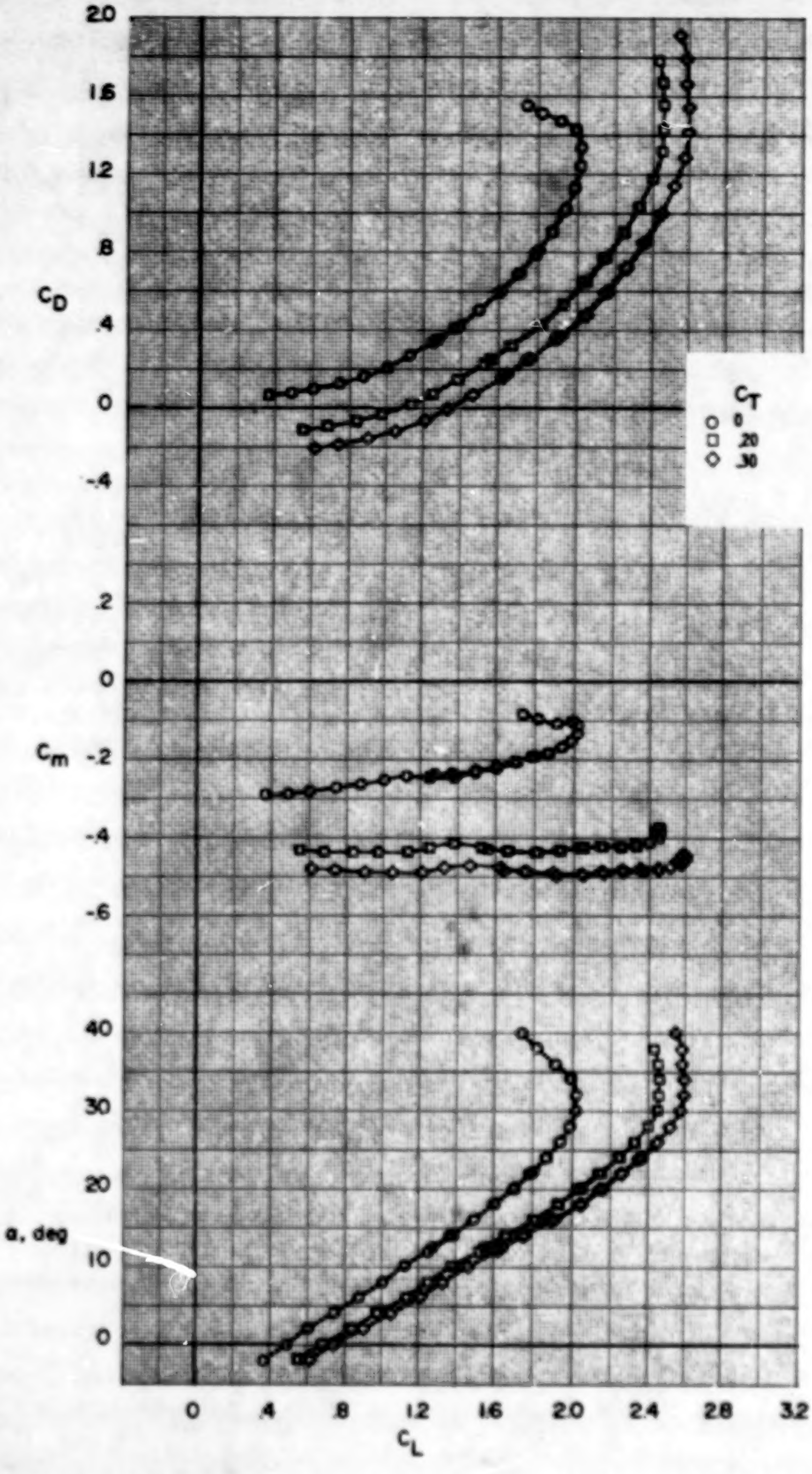
(a) $\delta_N = \delta_f = 0^{\circ}$.

Figure 9.- Effect of thrust coefficient on longitudinal aerodynamic characteristics of wing-canard configuration with various nozzle and flap deflections.



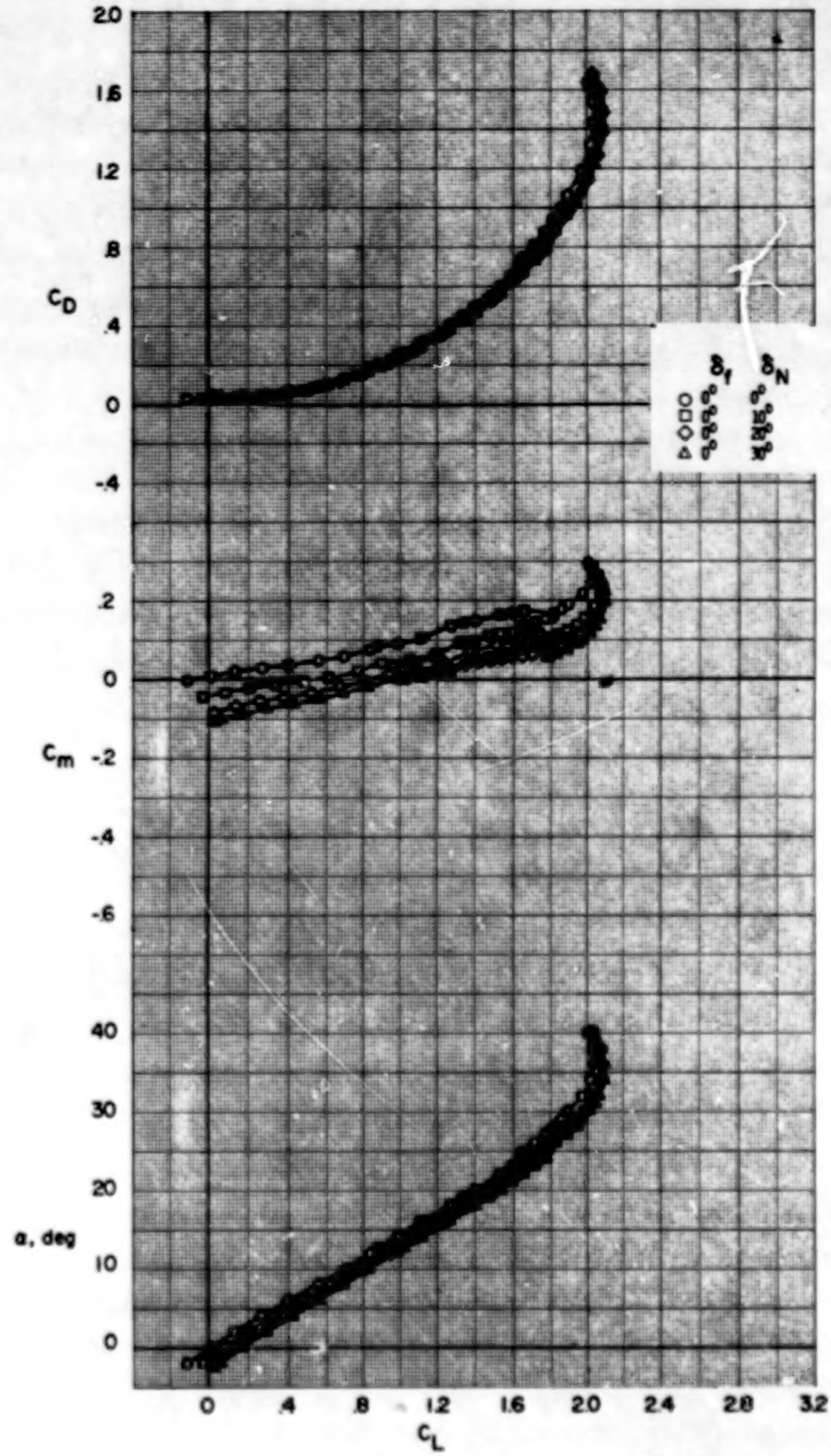
(b) $\delta_N = 30^o$; $\delta_f = 0^o$.

Figure 9.- Continued.



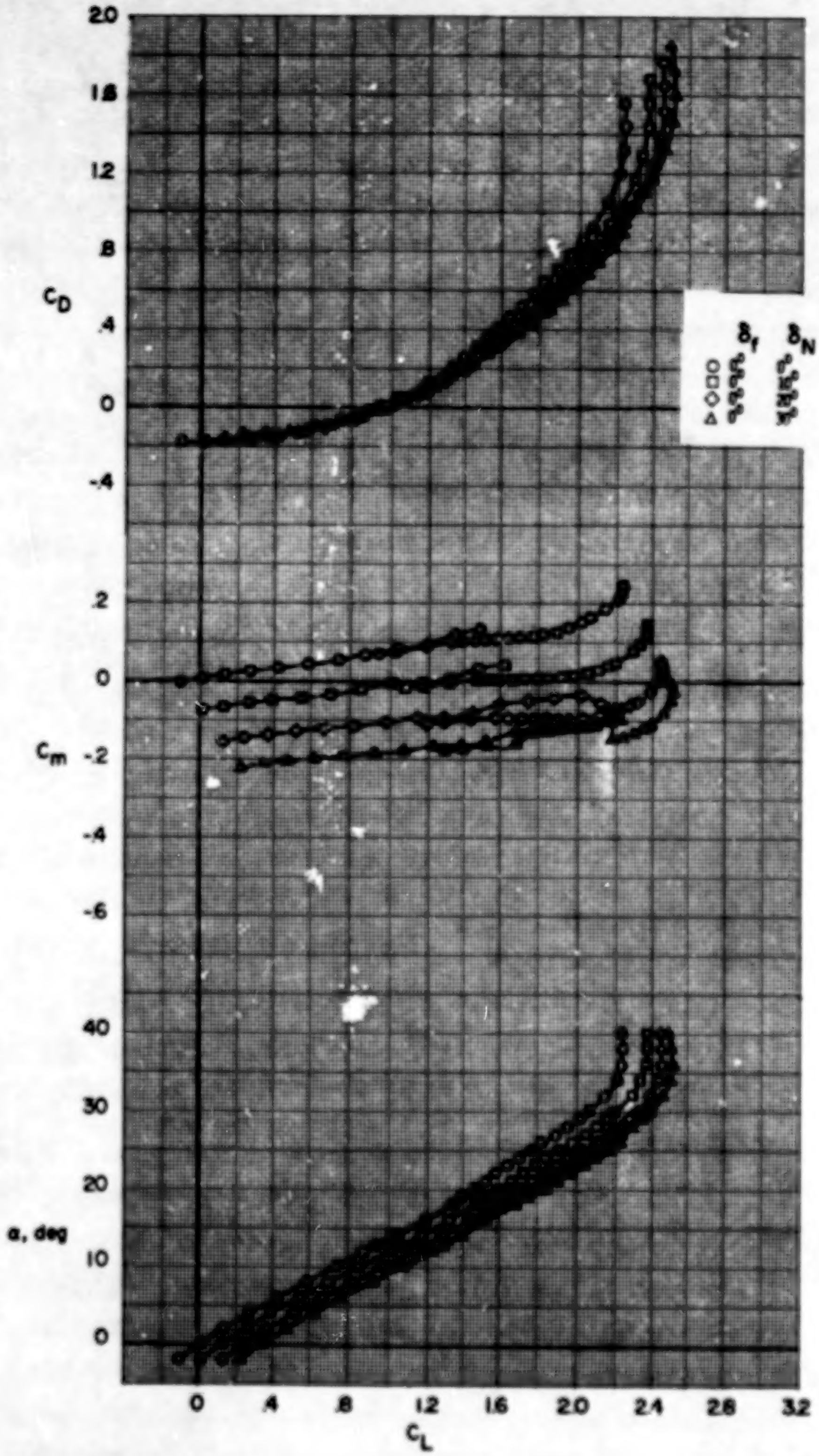
(c) $\delta_N = \delta_f = 30^{\circ}$.

Figure 9.- Concluded.



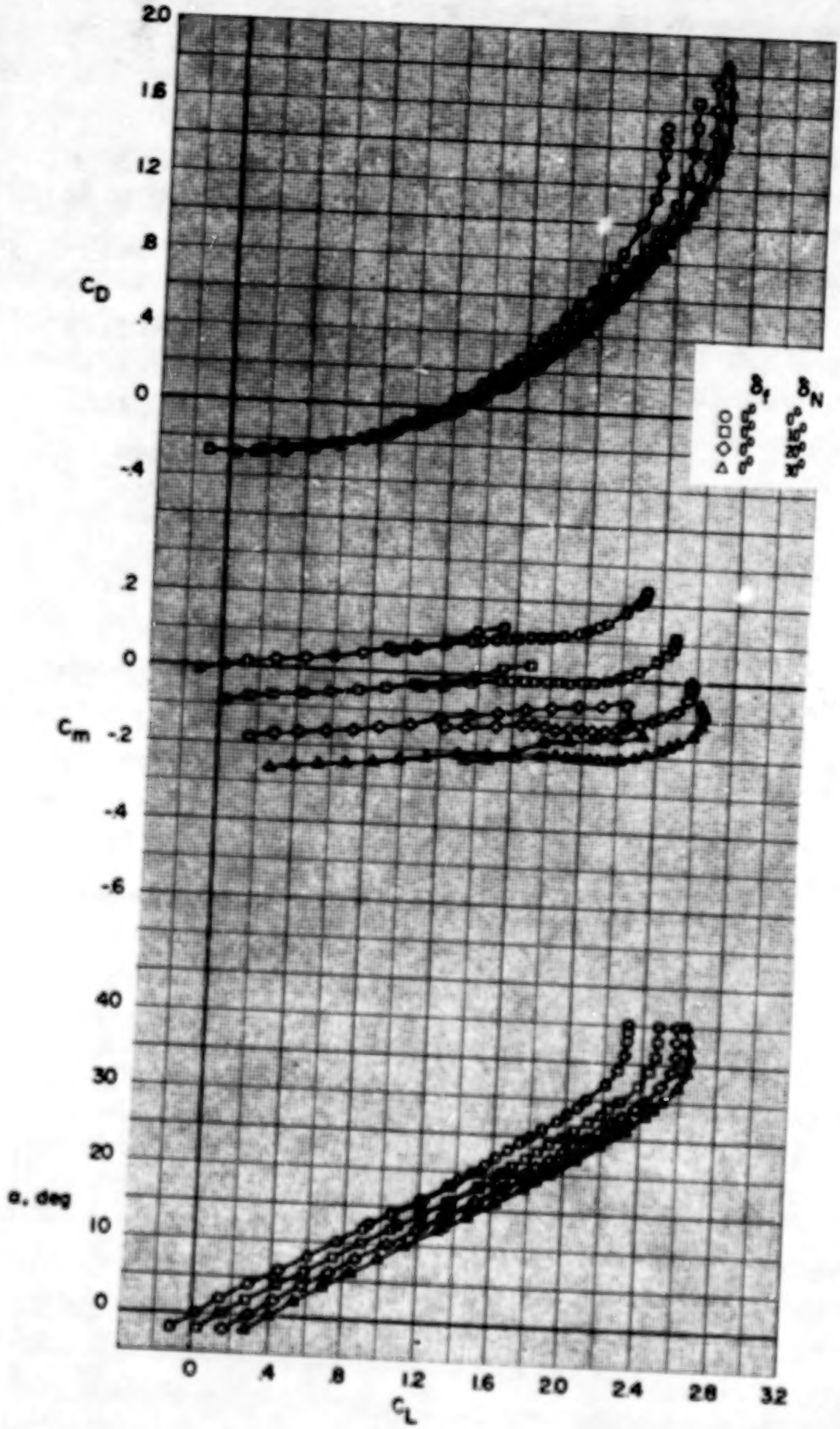
(a) $C_T = 0$.

Figure 10.- Effect of nozzle deflection on longitudinal aerodynamic characteristics of wing-canard-strake configuration at various thrust coefficients.



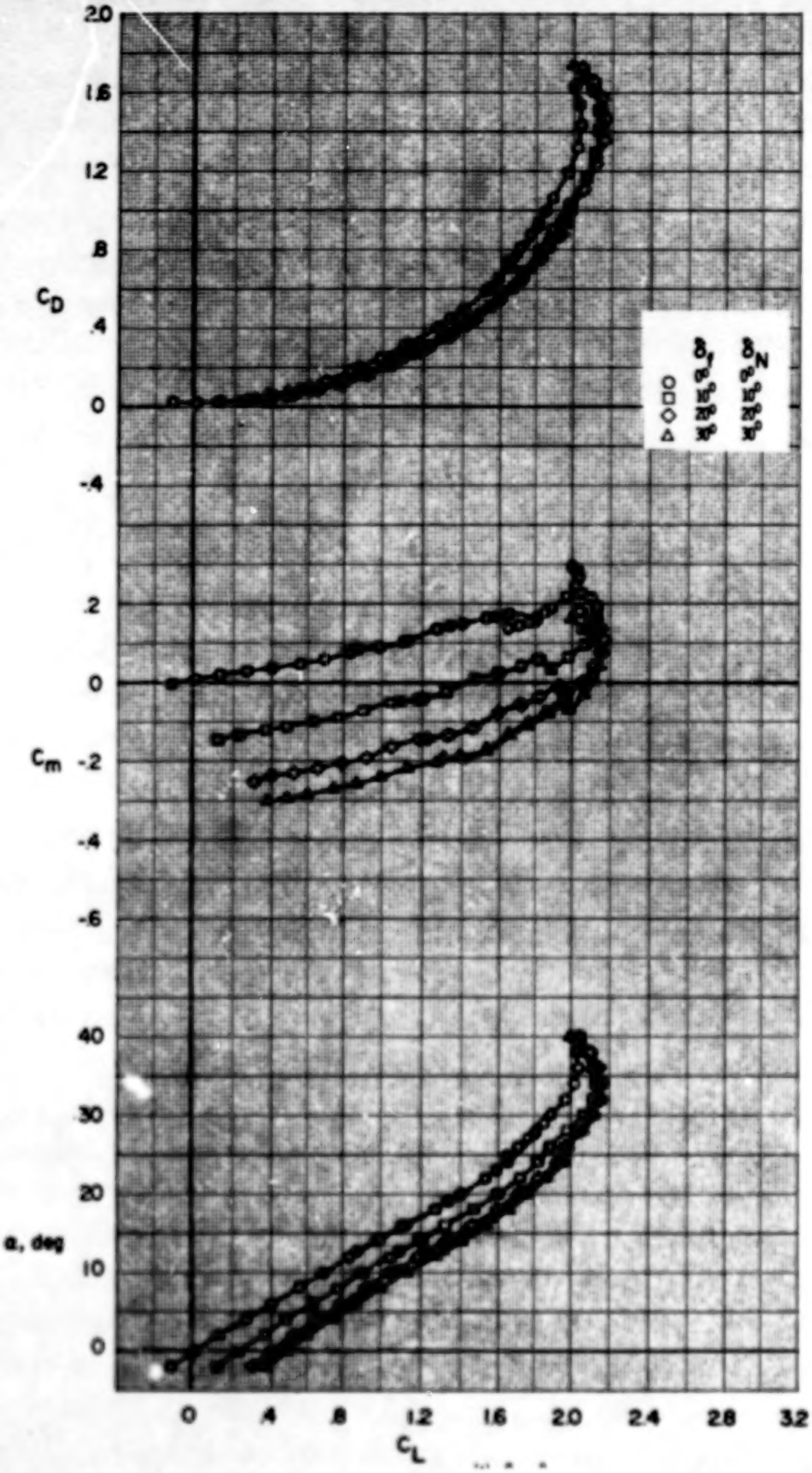
(b) $C_T = 0.20$.

Figure 10.- Continued.



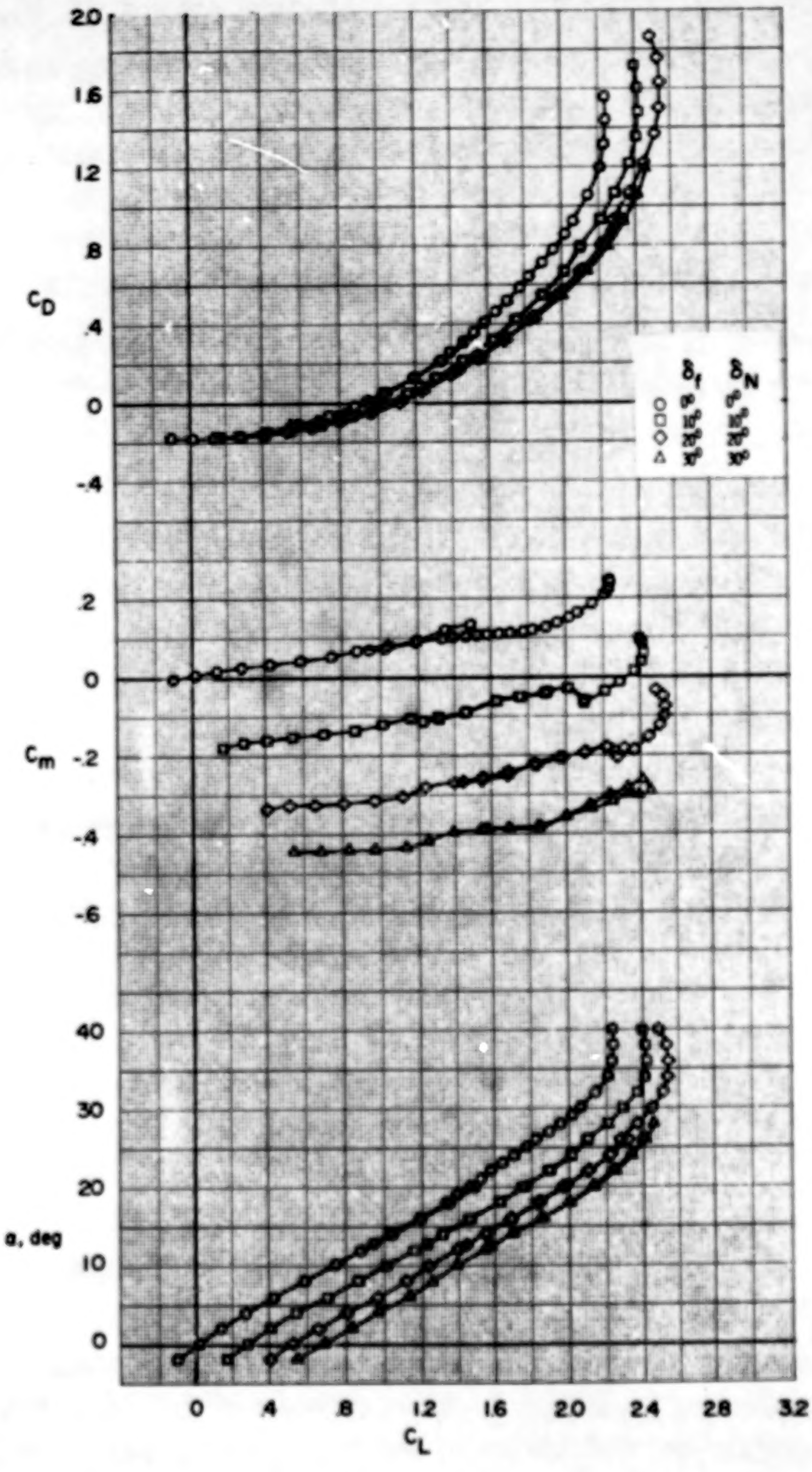
(c) $C_T = 0.30$.

Figure 10.- Concluded.



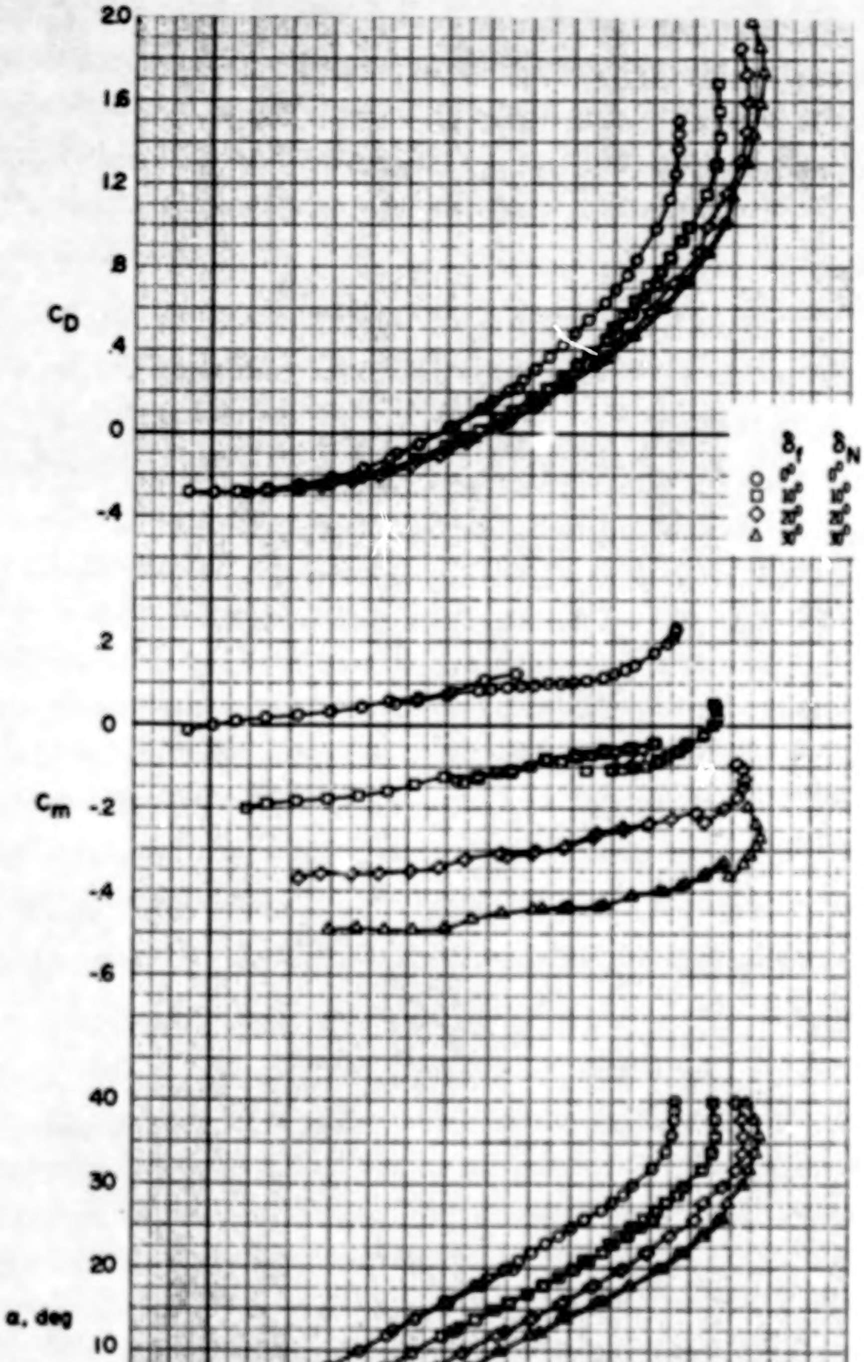
(a) $C_T = 0$.

Figure 11.- Effect of nozzle and flap deflection on longitudinal aerodynamic characteristics of wing-canard-strake configuration at various thrust coefficients.



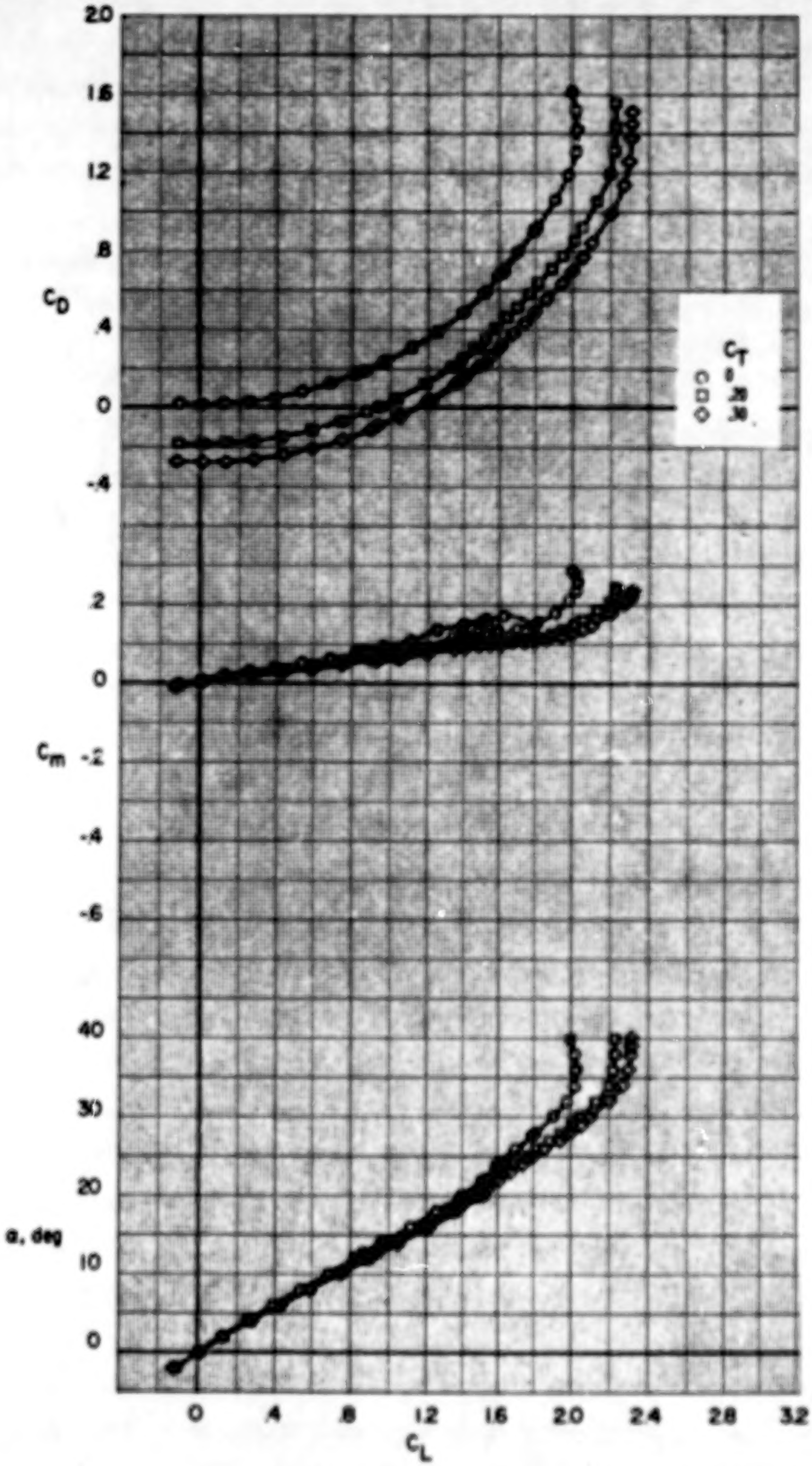
(b) C_T = 0.20.

Figure 11.- Continued.



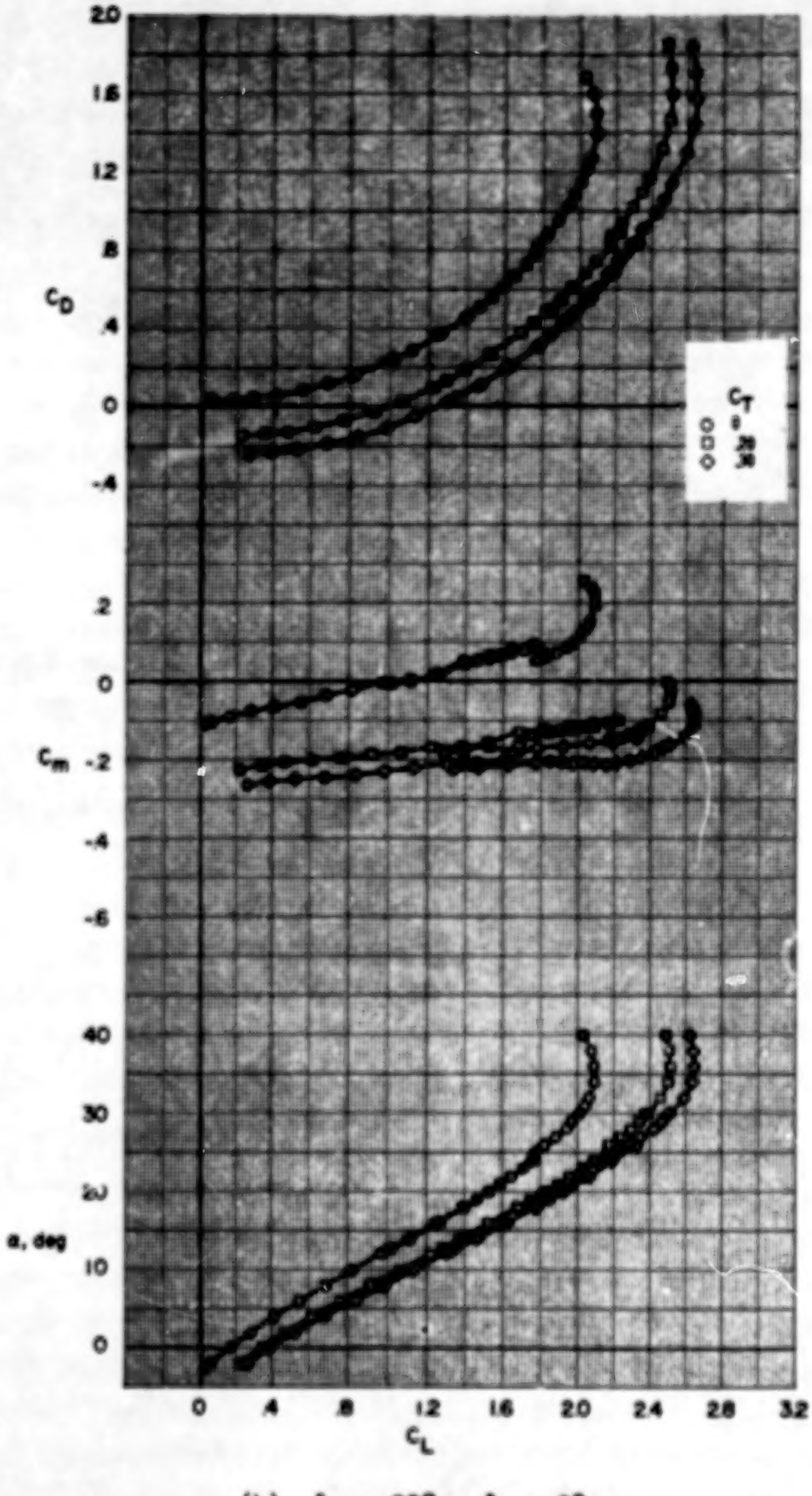
(c) C_T = 0.30.

Figure 11.- Concluded.



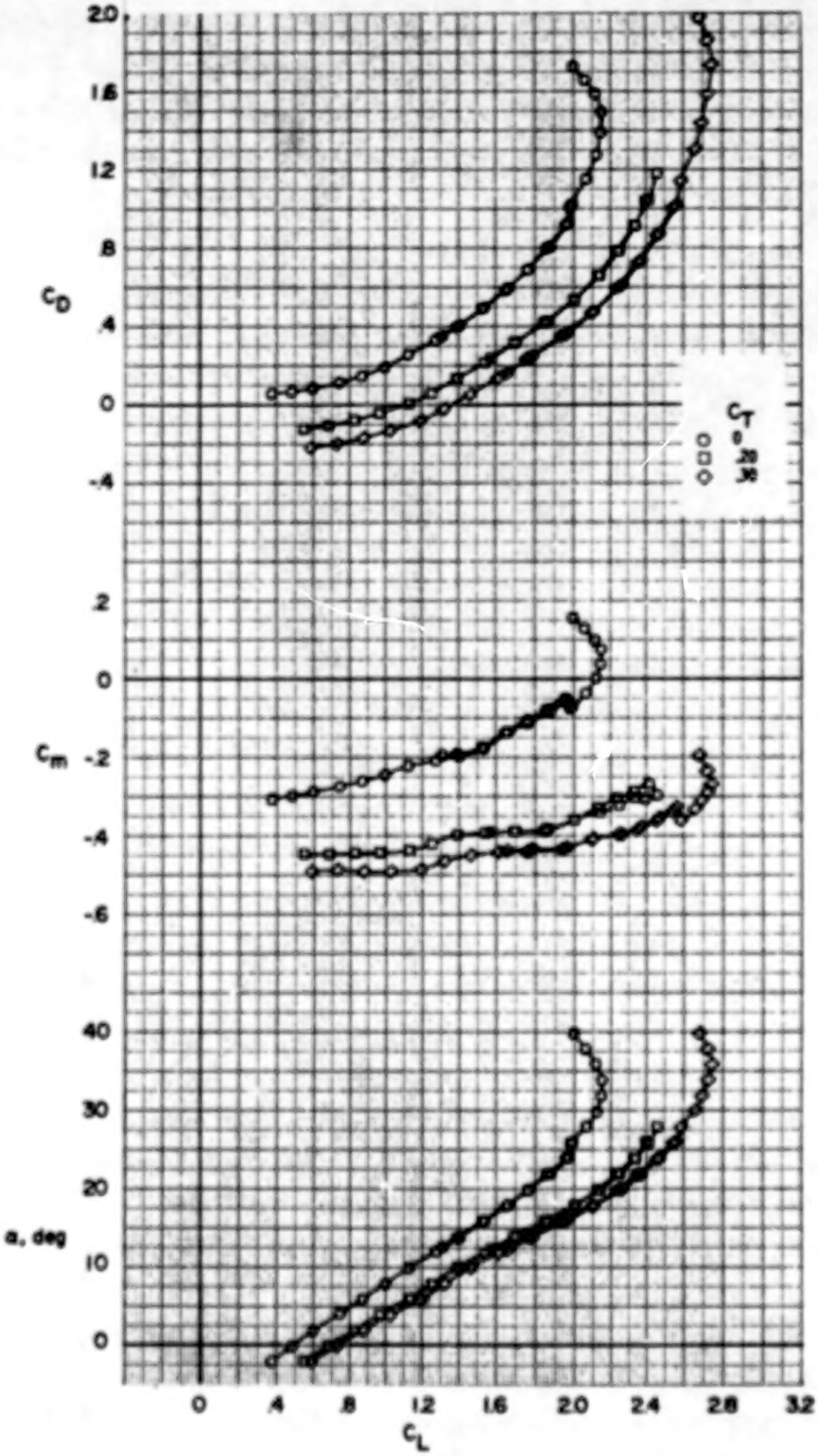
(a) $\delta_N = \delta_f = 0^\circ$.

Figure 12.- Effect of thrust coefficient on longitudinal aerodynamic characteristics of wing-canard-strake configuration at various nozzle and flap deflections.



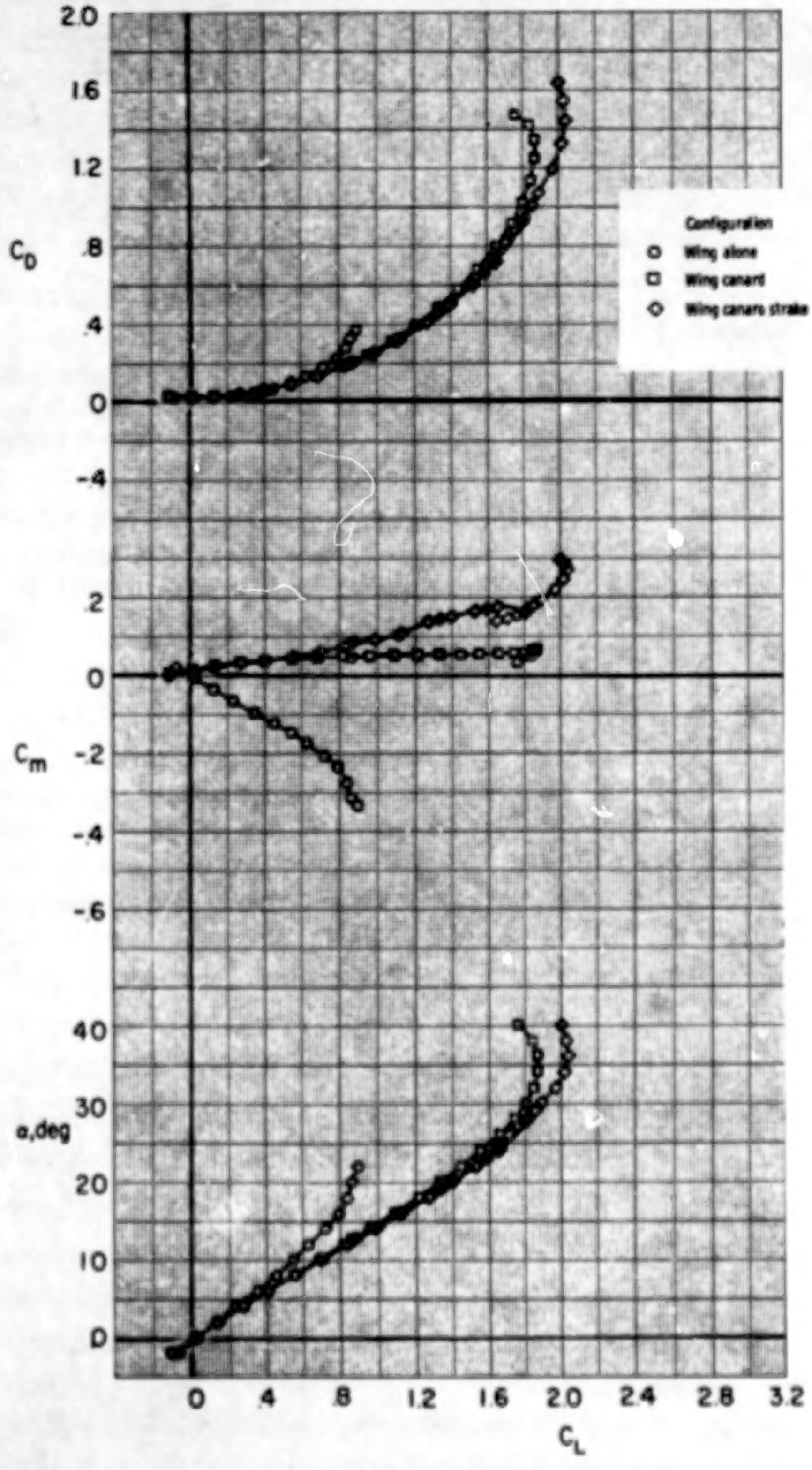
(b) $\delta_N = 30^o$; $\delta_f = 0^o$.

Figure 12.- Continued.



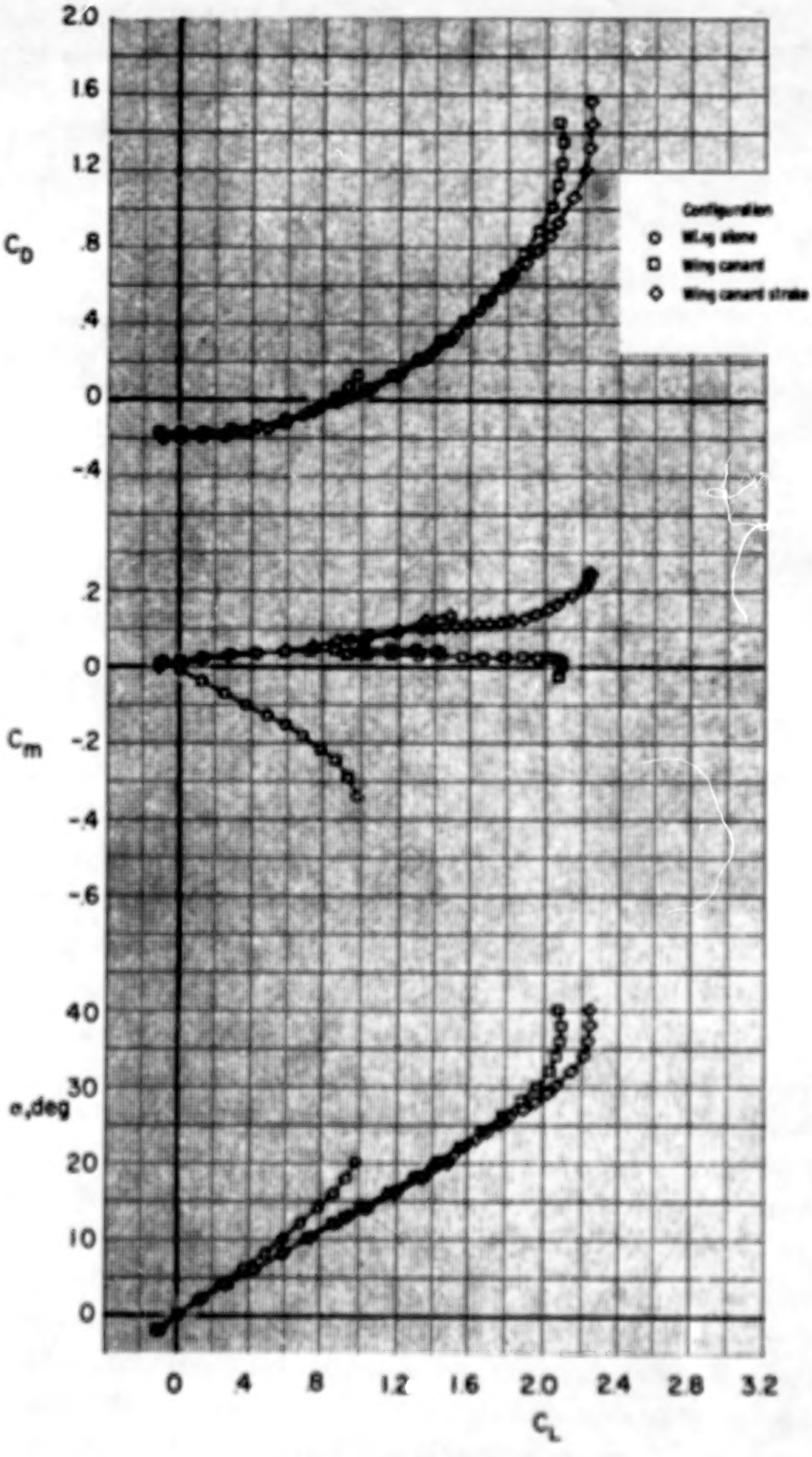
(c) $\delta_N = \delta_f = 30^{\circ}$.

Figure 12.- Concluded.



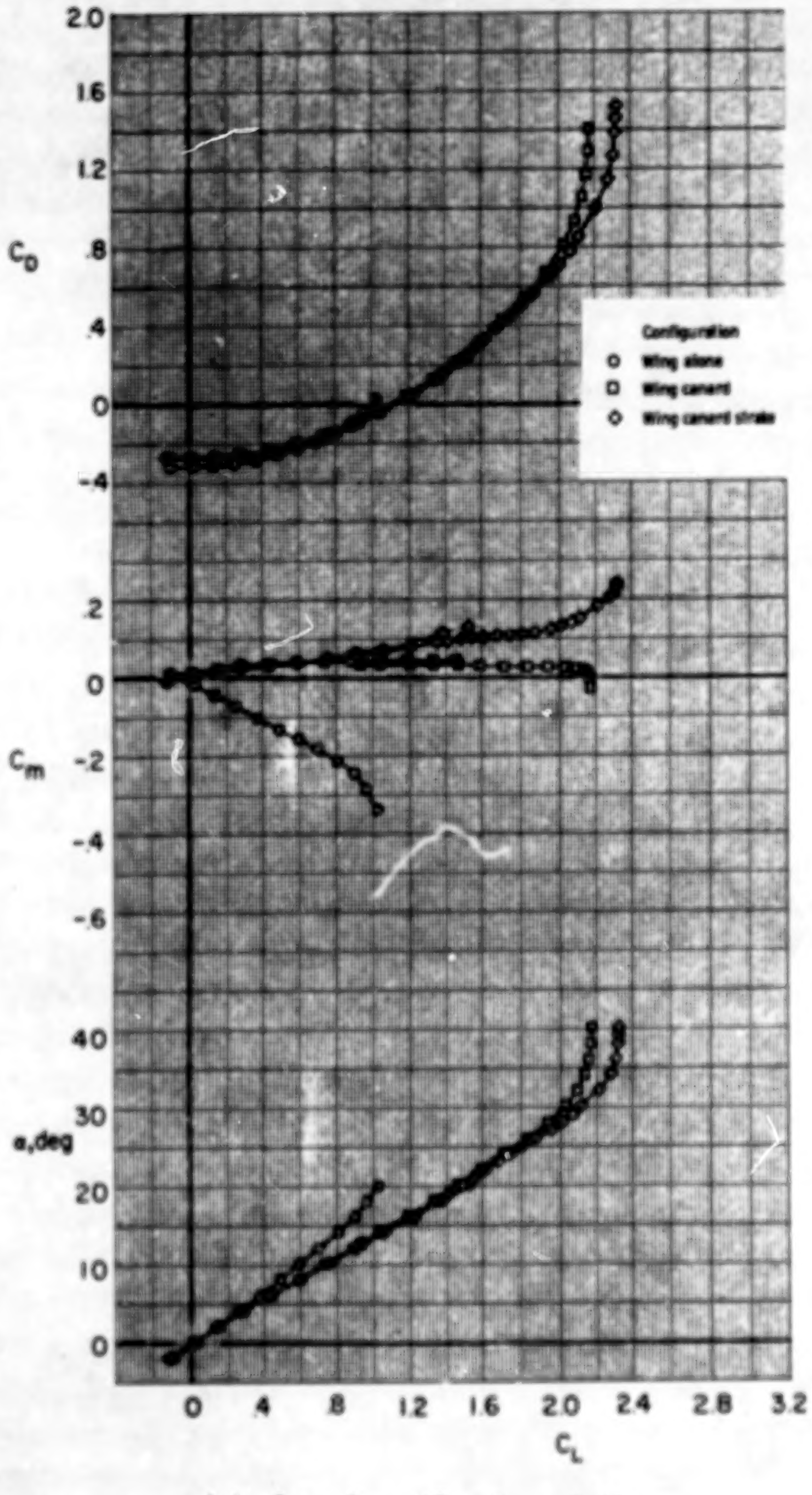
(a) $\delta_N = \delta_f = 0^{\circ}$; $C_T = 0$.

Figure 13.- Summary of effect of adding canard and strake to wing-alone configuration with various nozzle and flap deflections and nominal thrust coefficients.



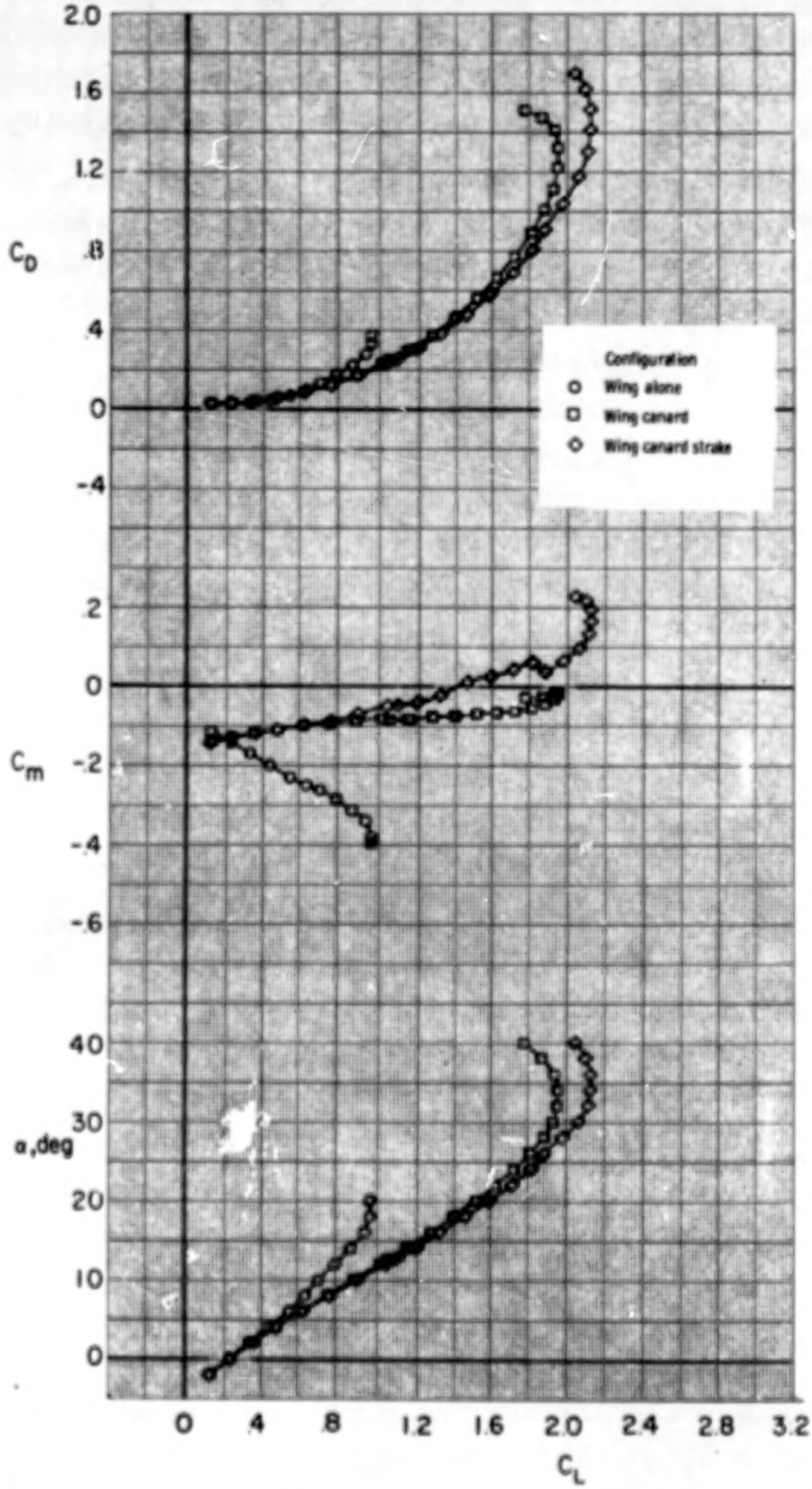
(b) $\delta_N = \delta_f = 0^o$; $C_T = 0.20$.

Figure 13.- Continued.



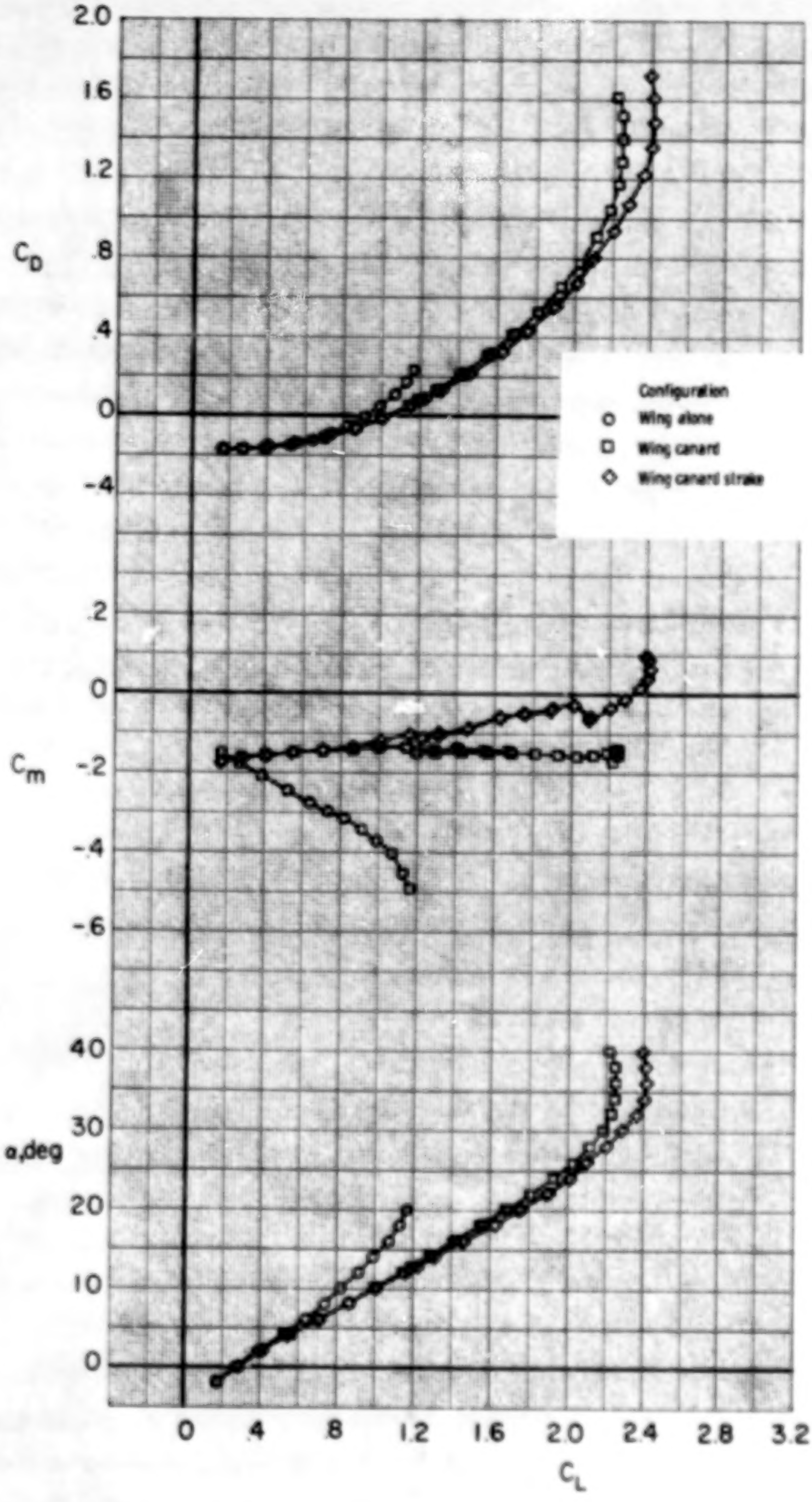
(c) $\delta_N = \delta_f = 0^{\circ}$; $C_T = 0.30$.

Figure 13.- Continued.



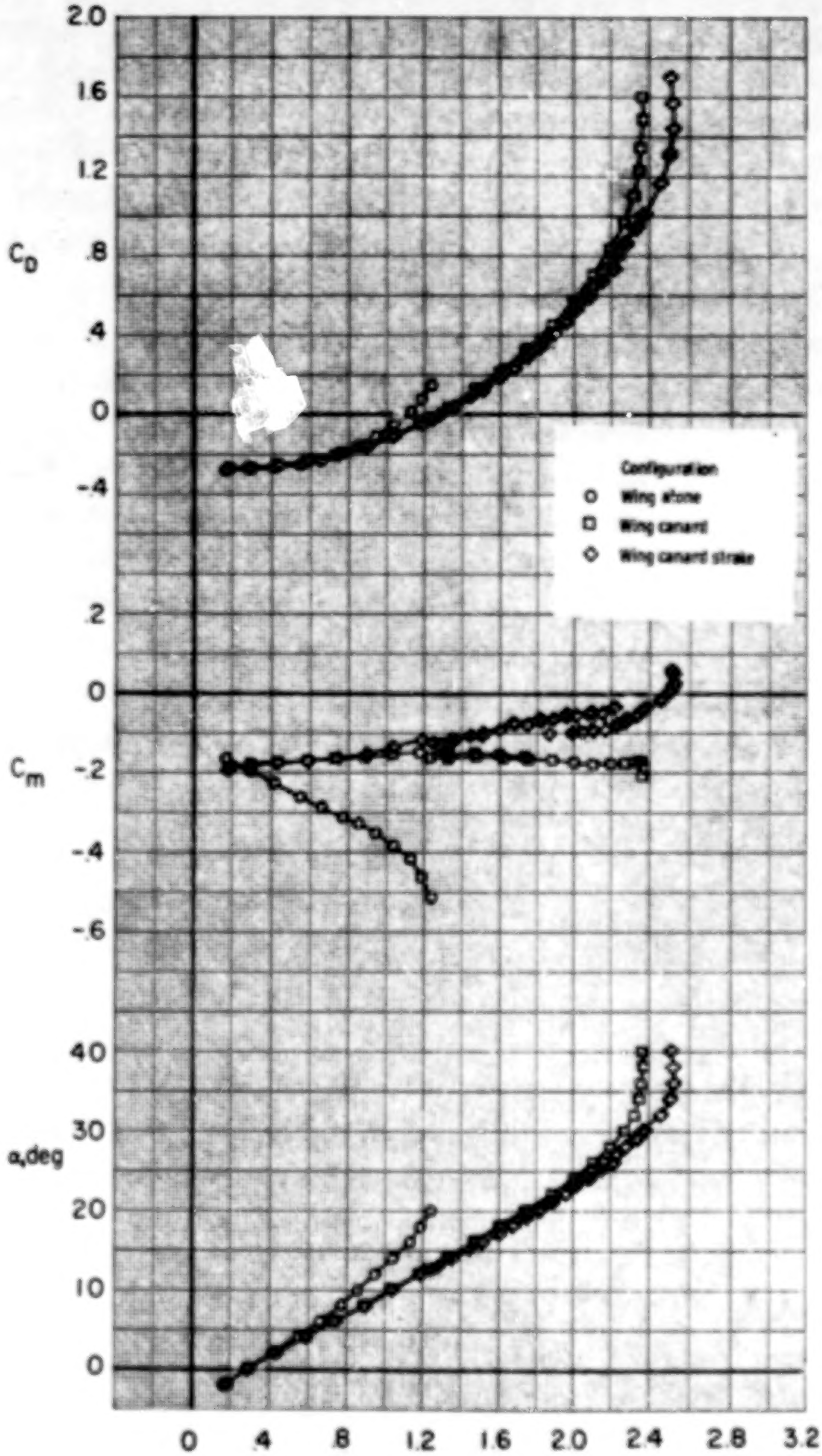
(d) $\delta_N = \delta_f = 10^o$; $C_T = 0$.

Figure 13.- Continued.



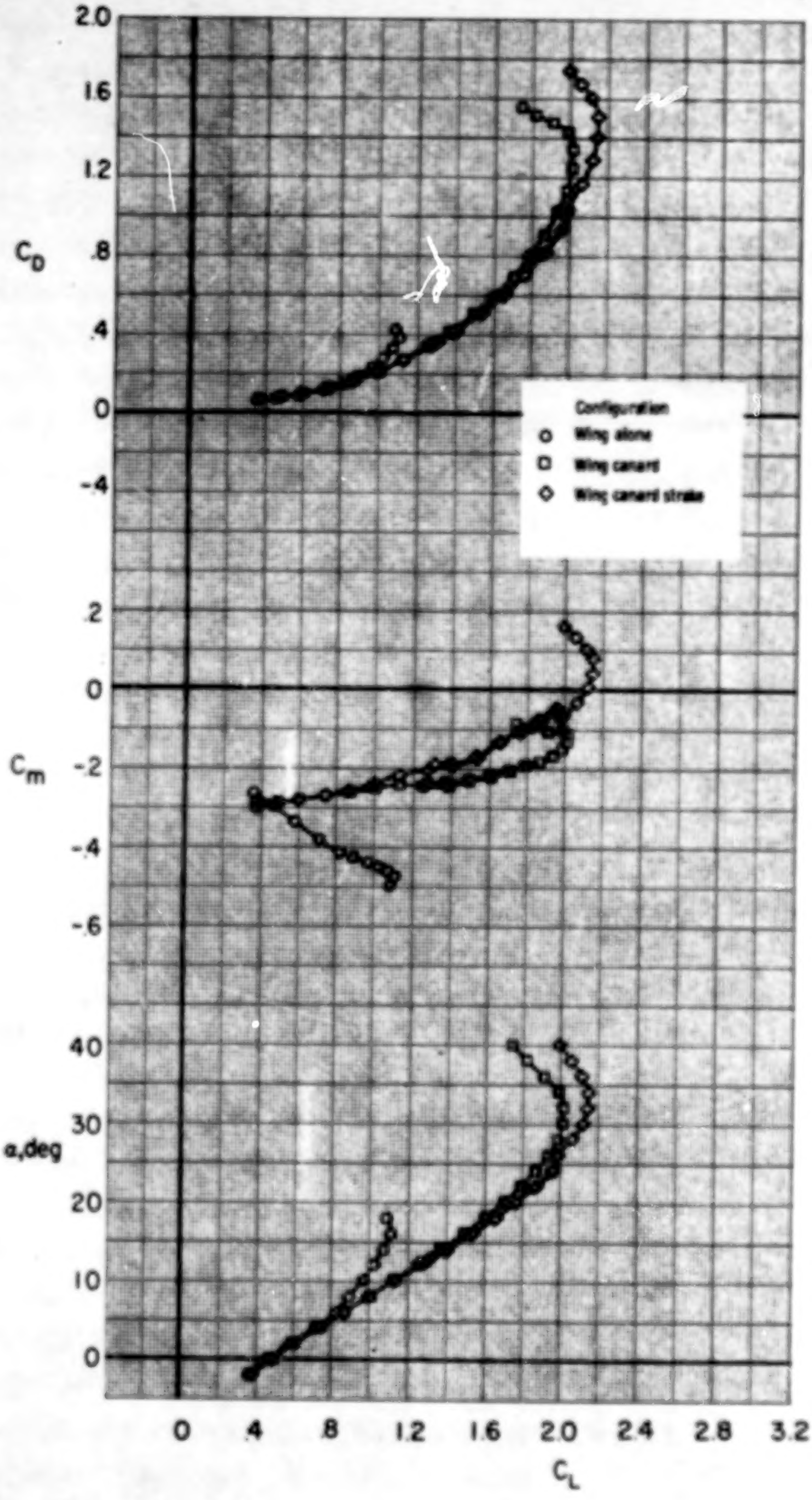
(e) $\delta_N = \delta_f = 10^o$; $C_T = 0.20$.

Figure 13.- Continued.



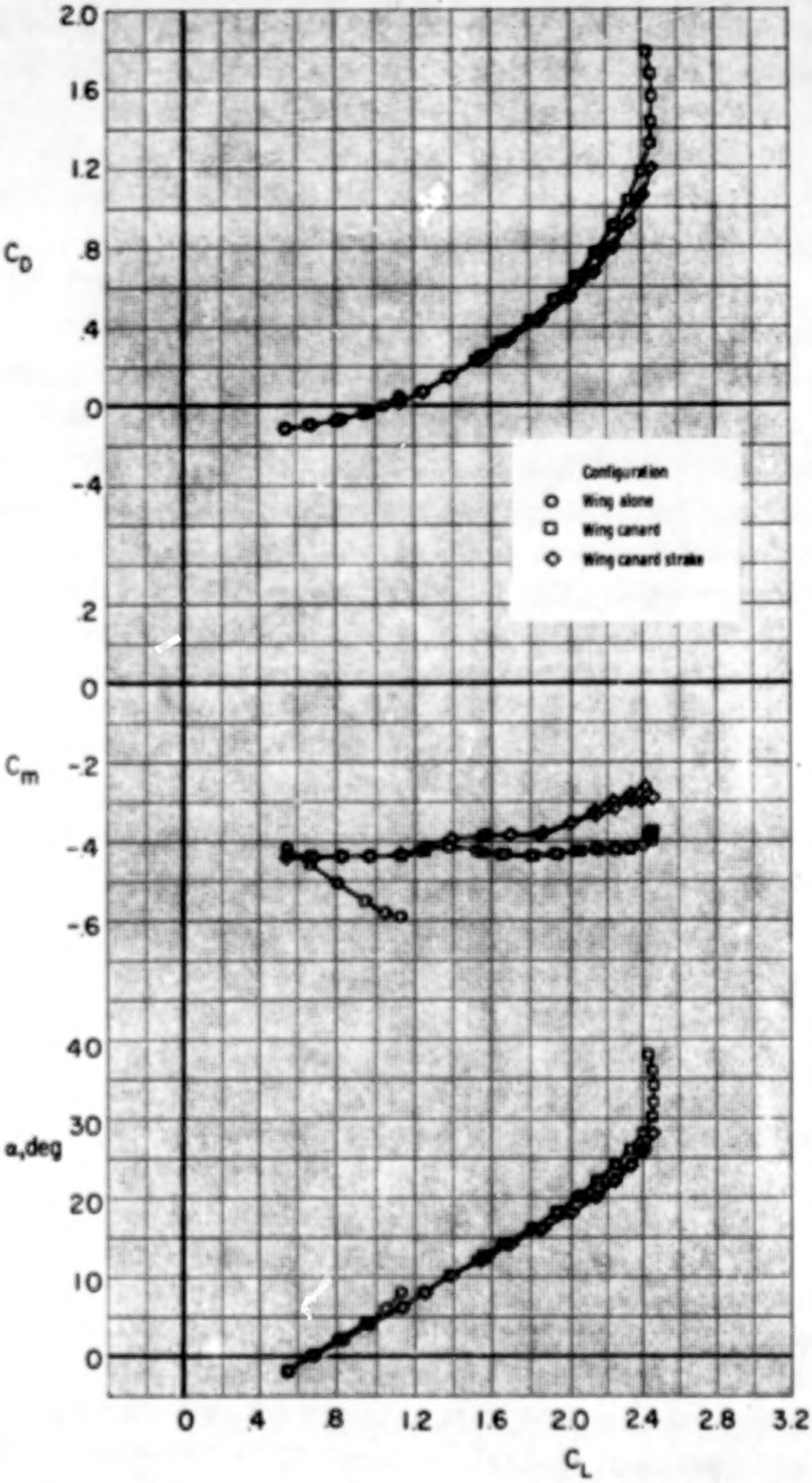
(f) $\delta_N = \delta_f = 10^{\circ}$; $C_T = 0.30$.

Figure 13.- Continued.



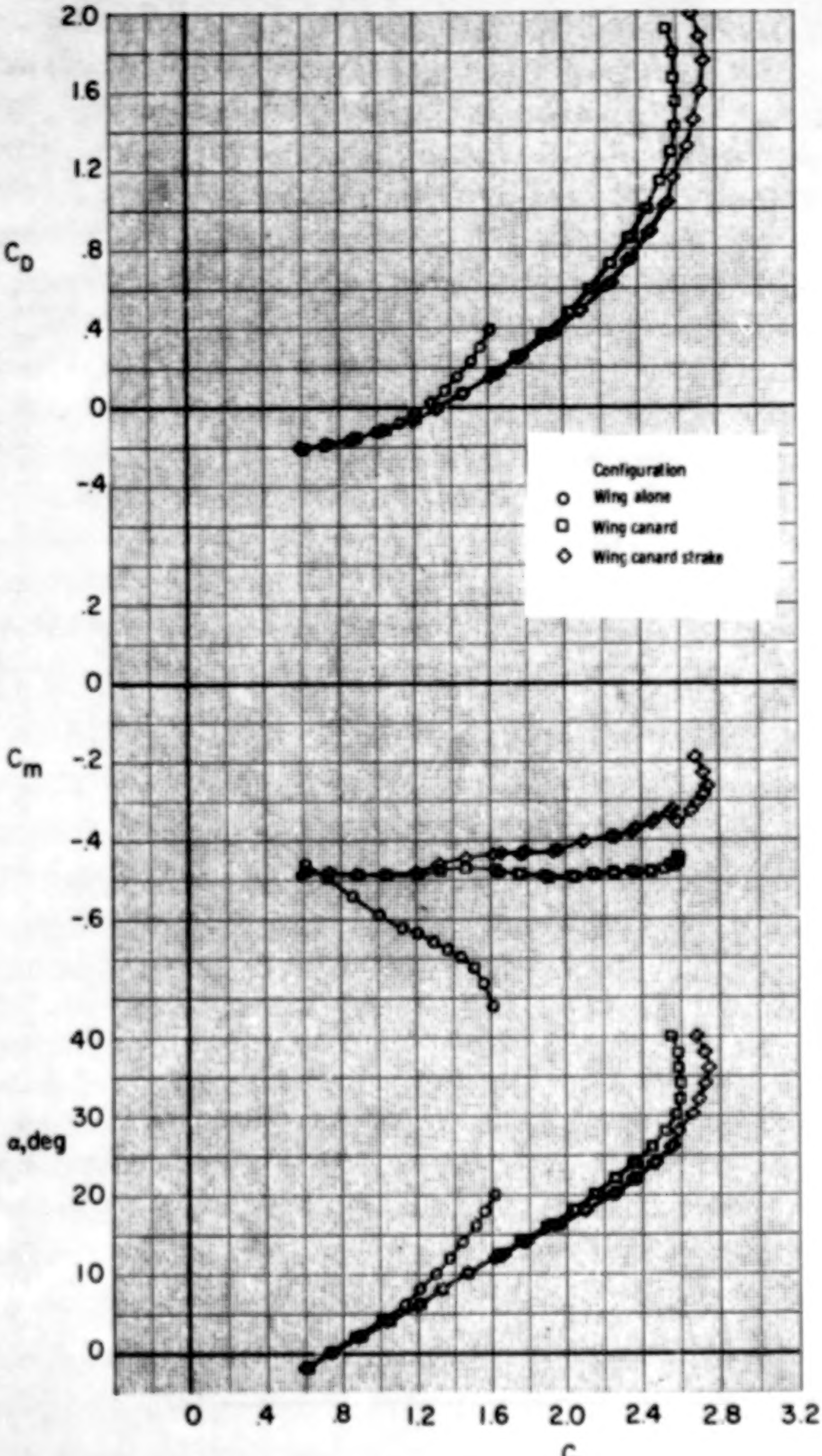
(g) $\delta_N = \delta_f = 30^{\circ}$; $C_T = 0$.

Figure 13.- Continued.



(h) $\delta_N = \delta_f = 30^\circ$; $C_T = 0.20$.

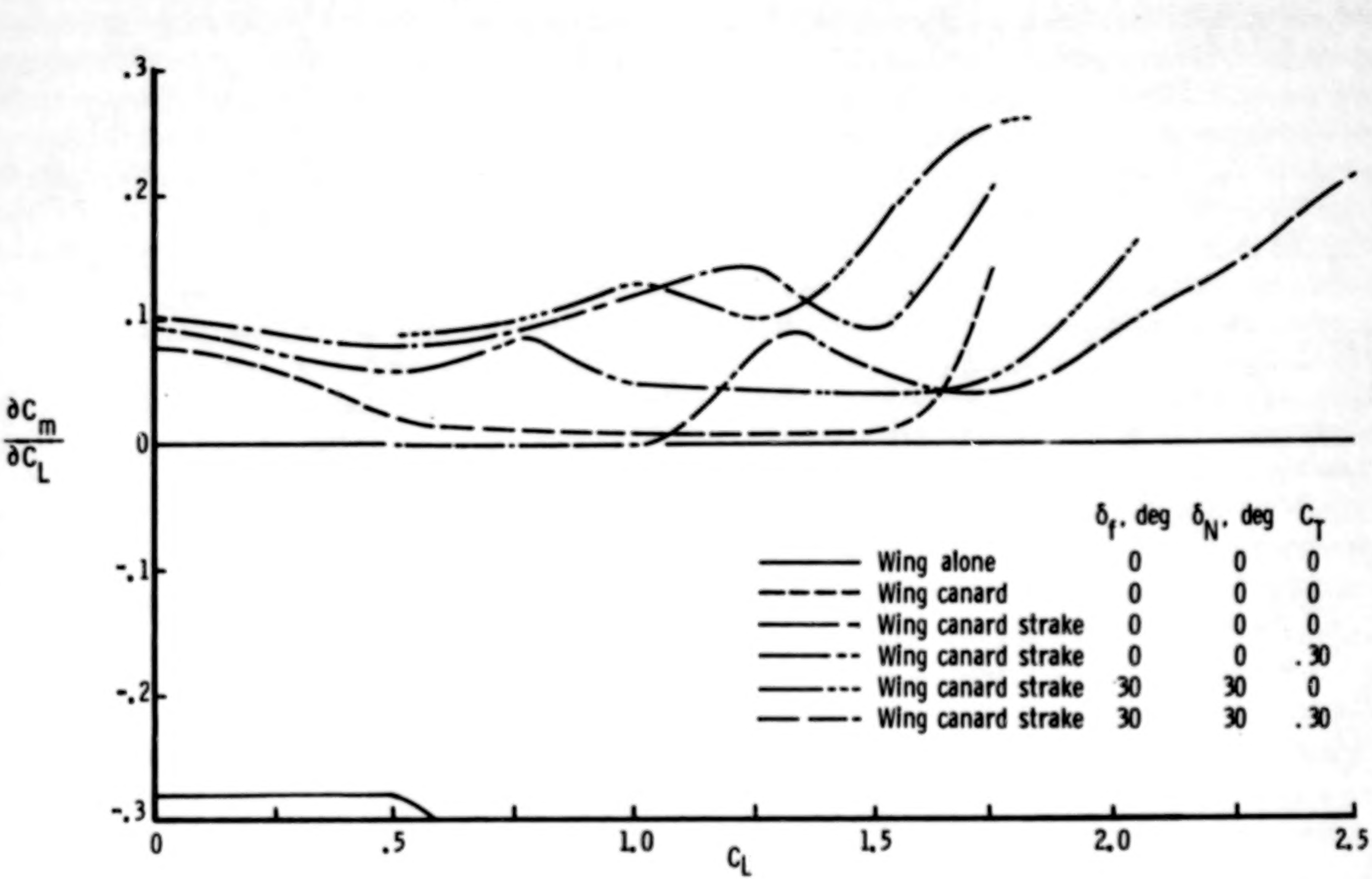
Figure 13.- Continued.



73.

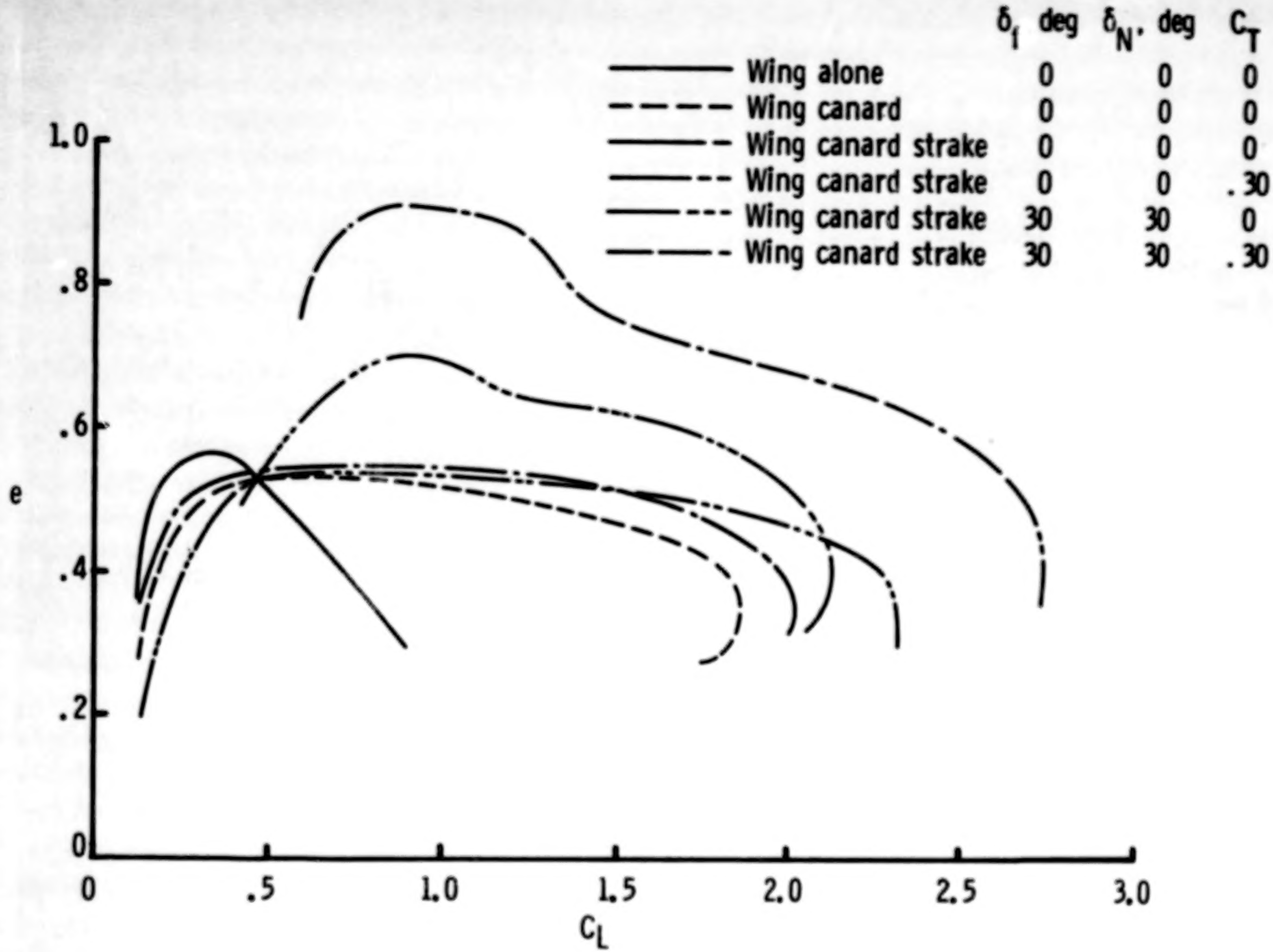
(i) $\delta_N = \delta_f = 30^o$; $C_T = 0.30$.

Figure 13.- Concluded.



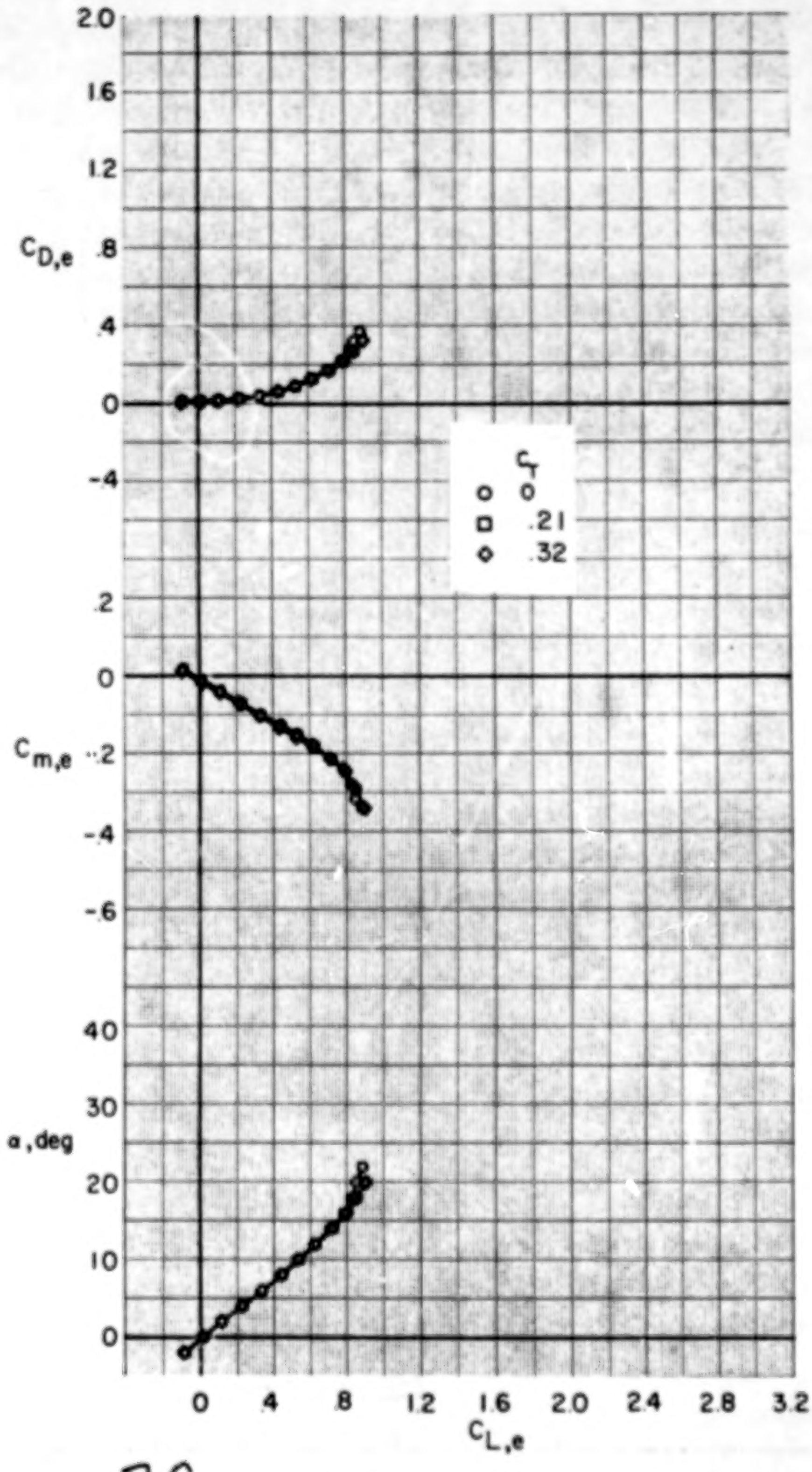
(a) $\partial C_m/\partial C_L$.

Figure 14.- Summary of effects of configuration change, nozzle and flap deflection, and thrust coefficient on model stability characteristics and drag-due-to-lift efficiency factor.



(b) Drag-due-to-lift efficiency factor e.

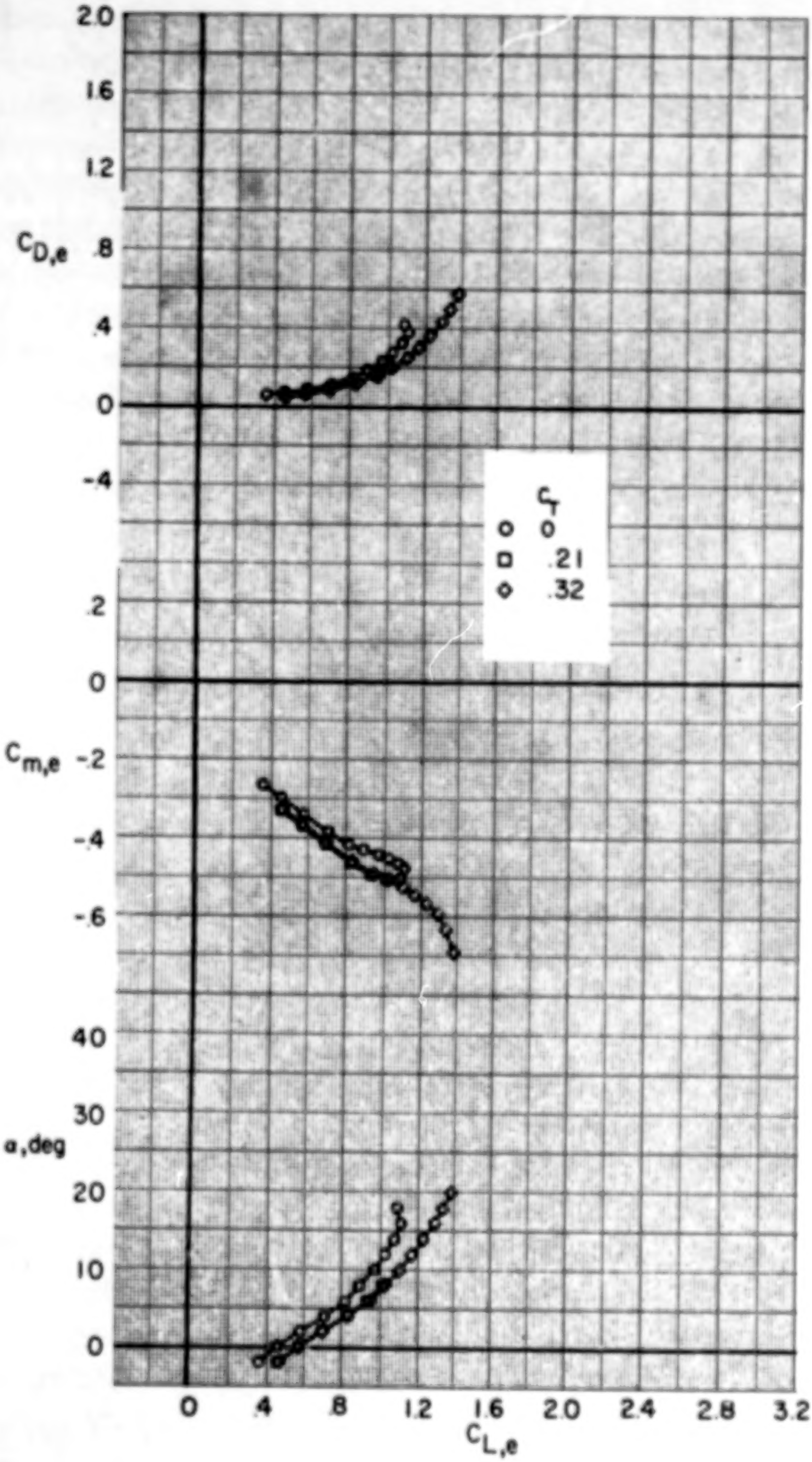
Figure 14.- Concluded.



76.

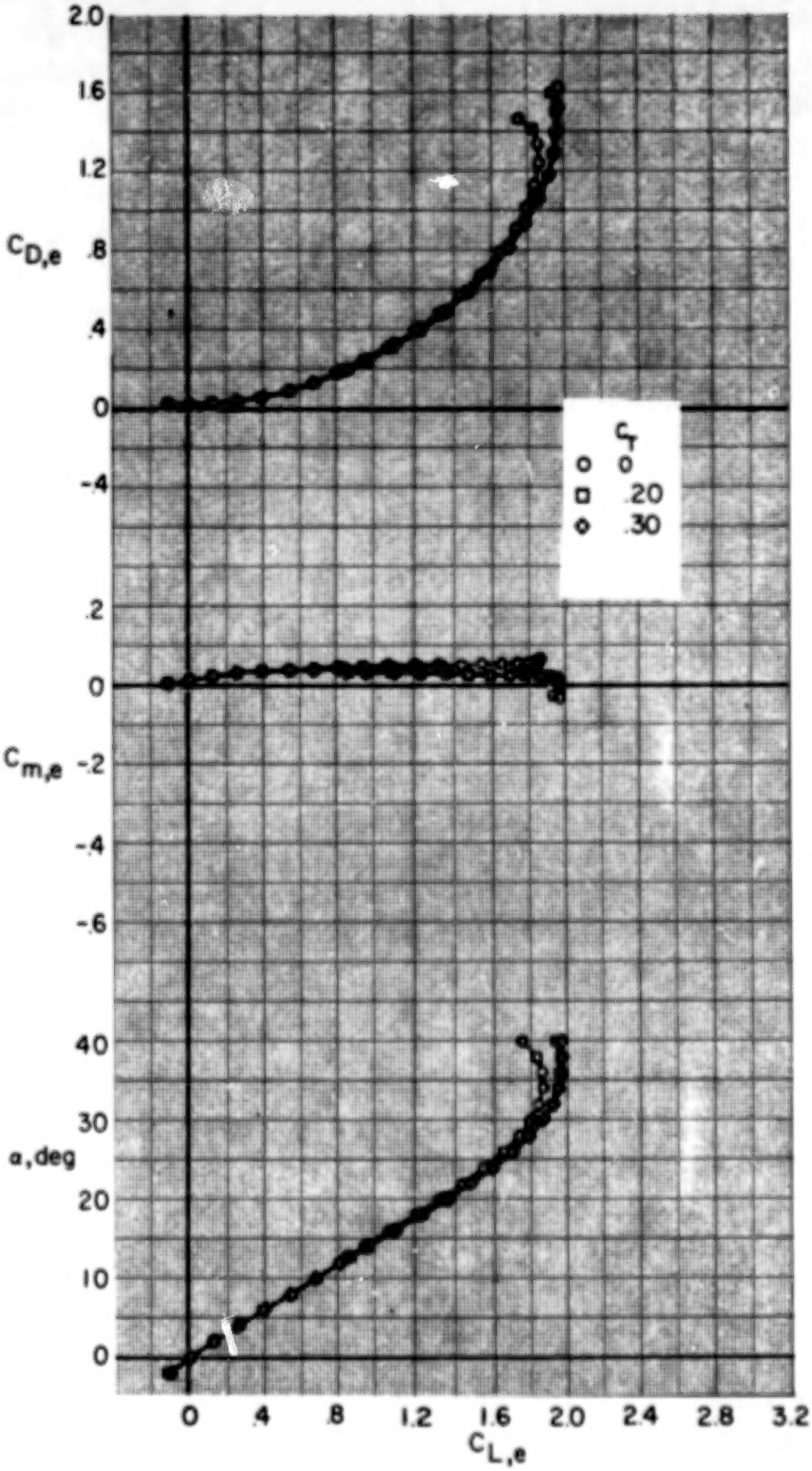
(a) $\delta_N = \delta_f = 0^{\circ}$.

Figure 15.- Thrust-removed longitudinal aerodynamic characteristics of wing-alone configuration at various nozzle and flap deflections.



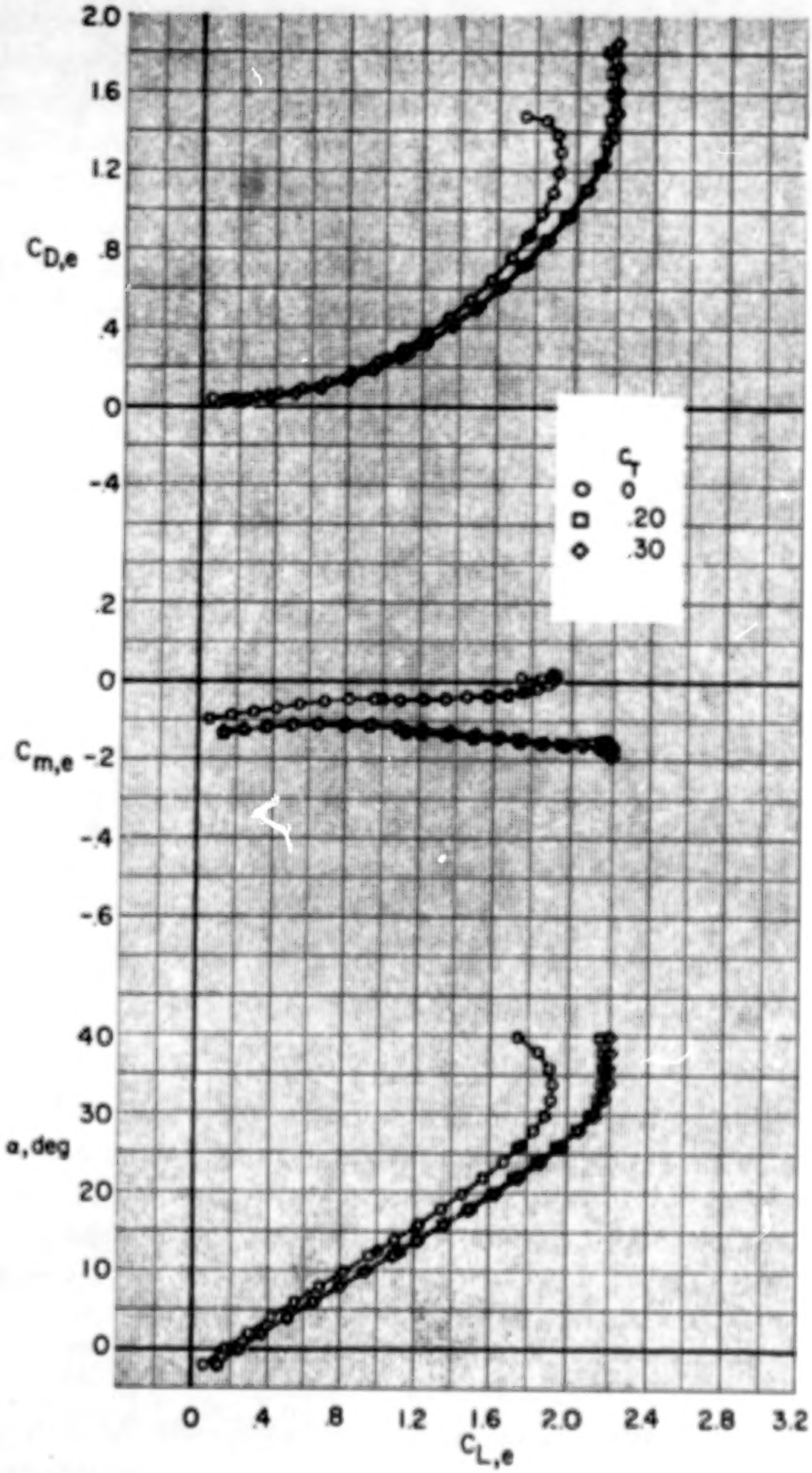
(b) $\delta_N = \delta_f = 30^{\circ}$.

Figure 15.- Concluded.



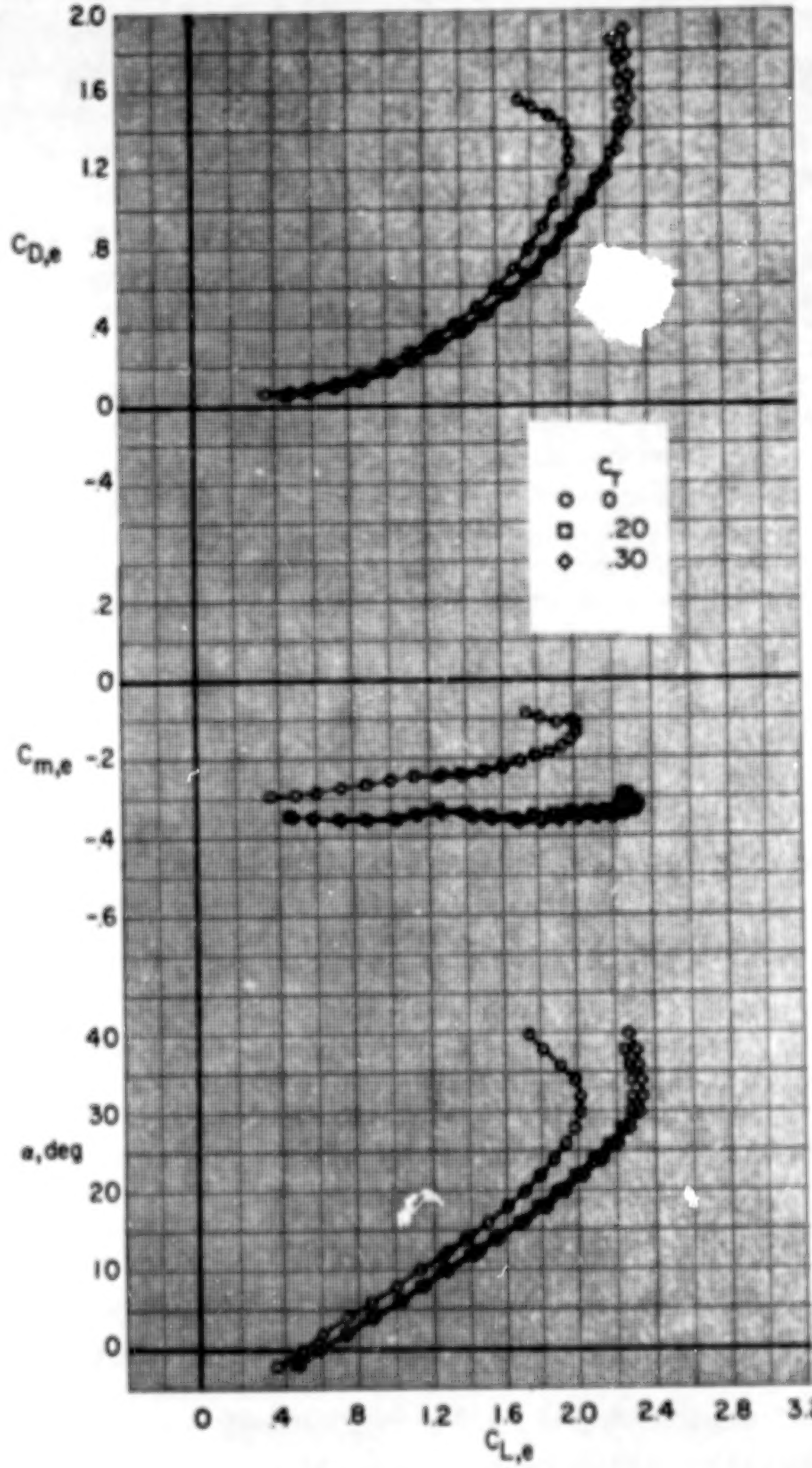
(a) $\delta_N = \delta_f = 0^\circ$.

Figure 16.- Thrust-removed longitudinal aerodynamic characteristics of wing-canard configuration at various nozzle and flap deflections.



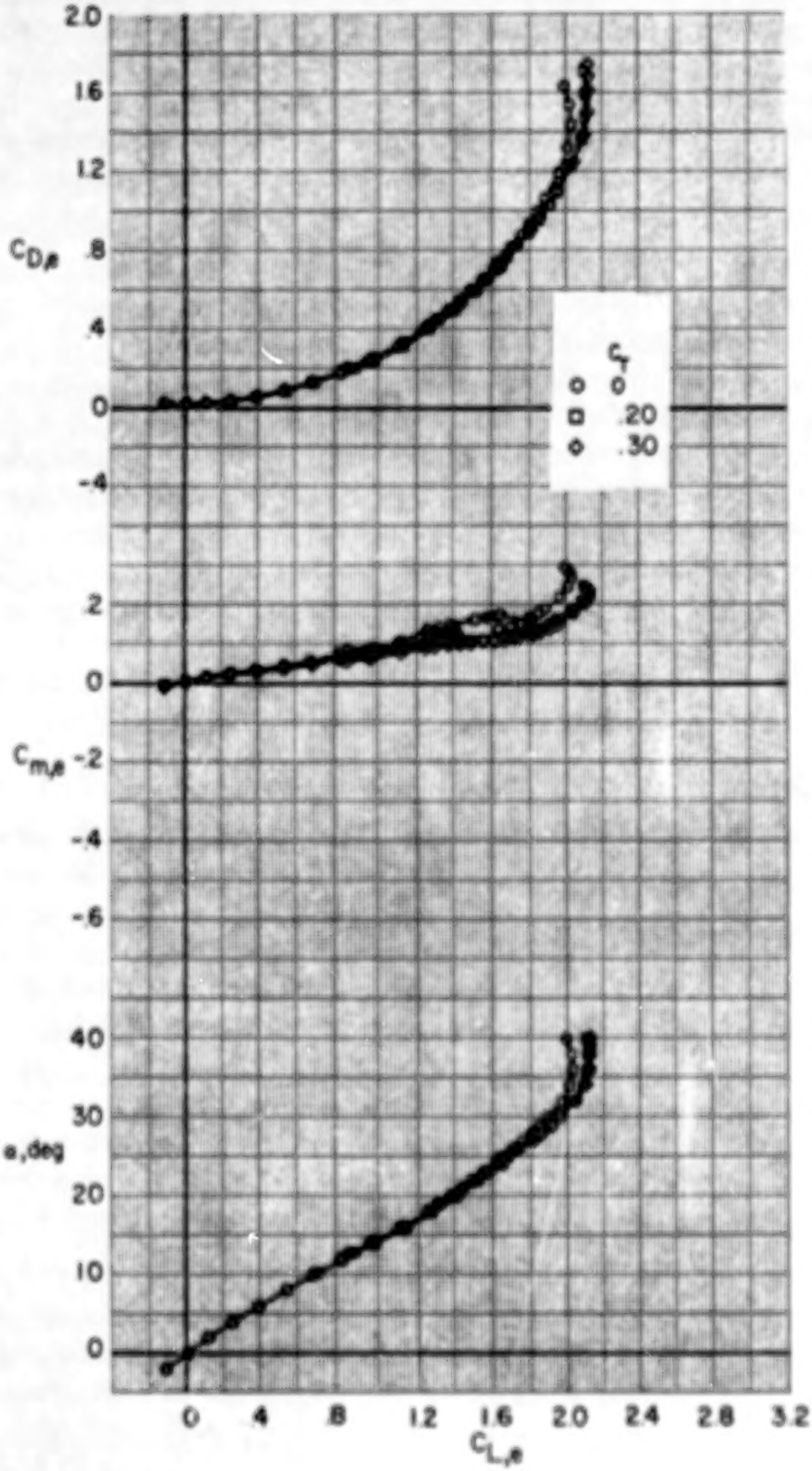
(b) $\delta_N = 30^\circ$; $\delta_f = 0^\circ$.

Figure 16.- Continued.



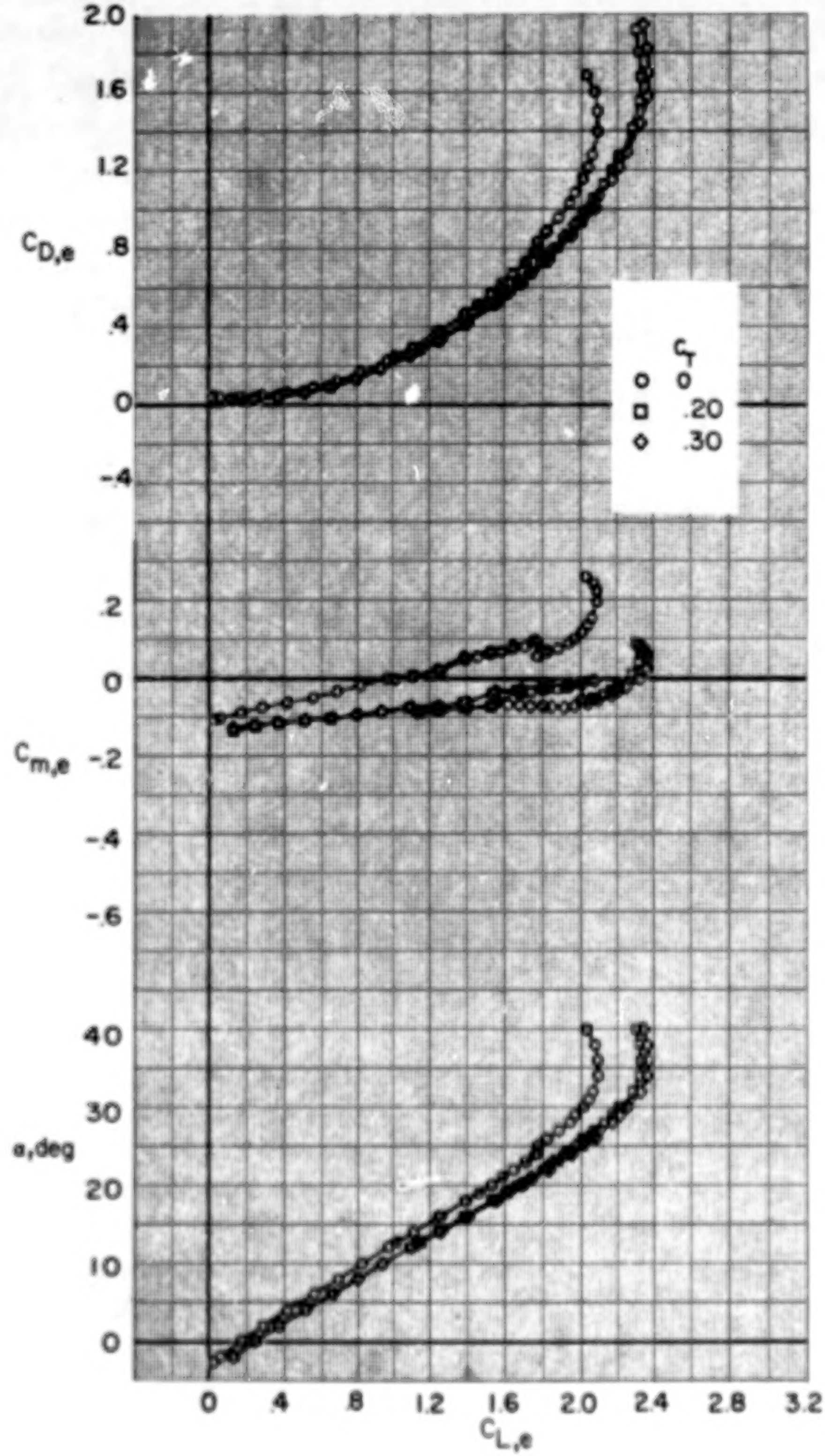
(c) $\delta_N = \delta_f = 30^o$.

Figure 16.- Concluded.



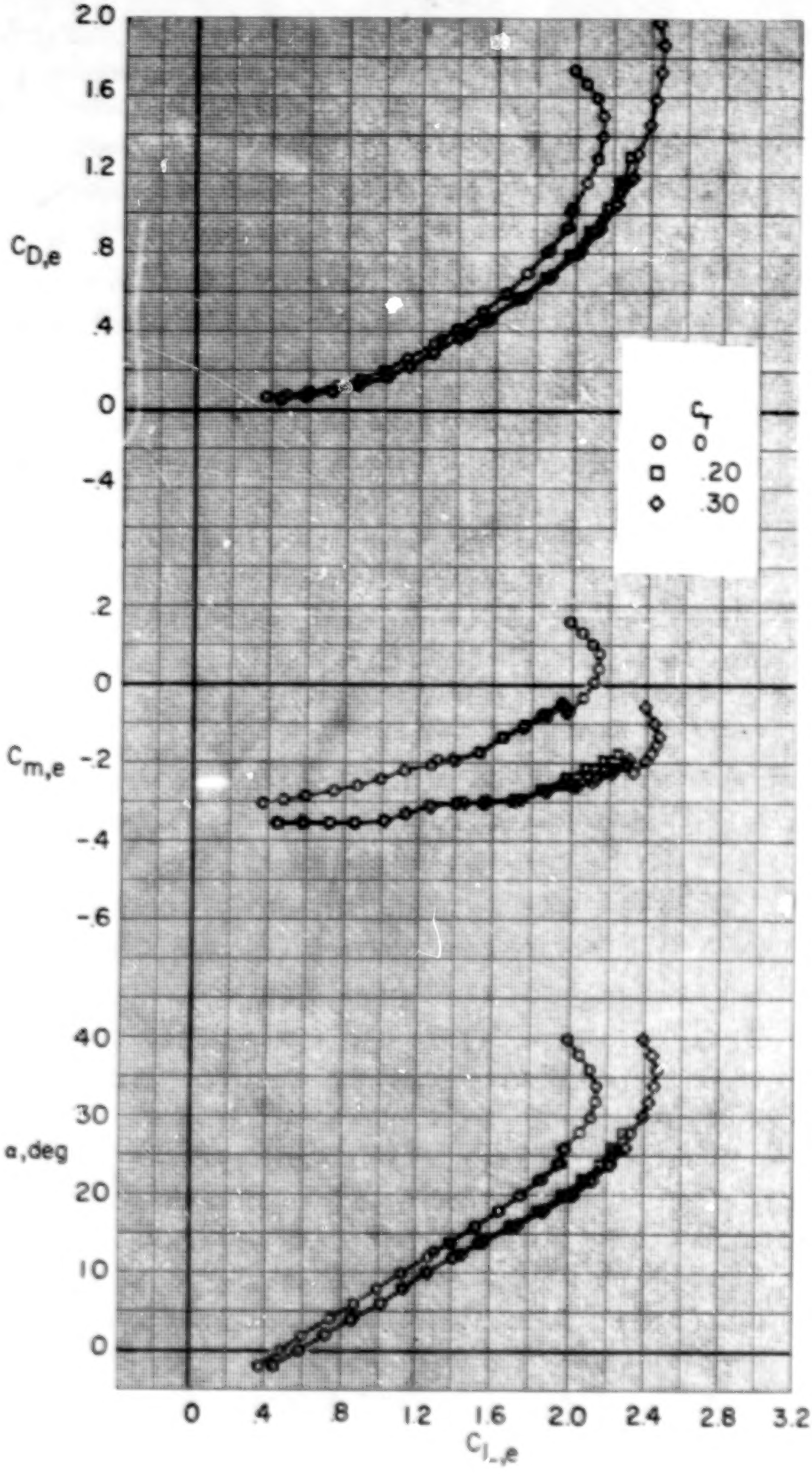
(a) $\delta_N = \delta_f = 0^{\circ}$.

Figure 17.- Thrust-removed longitudinal aerodynamic characteristics of wing-canard-strake configuration at various nozzle and flap deflections.



(b) $\delta_N = 30^{\circ}$; $\delta_f = 0^{\circ}$.

Figure 17.- Continued.



(c) $\delta_N = \delta_f = 30^\circ$.

Figure 17.- Concluded.

83.

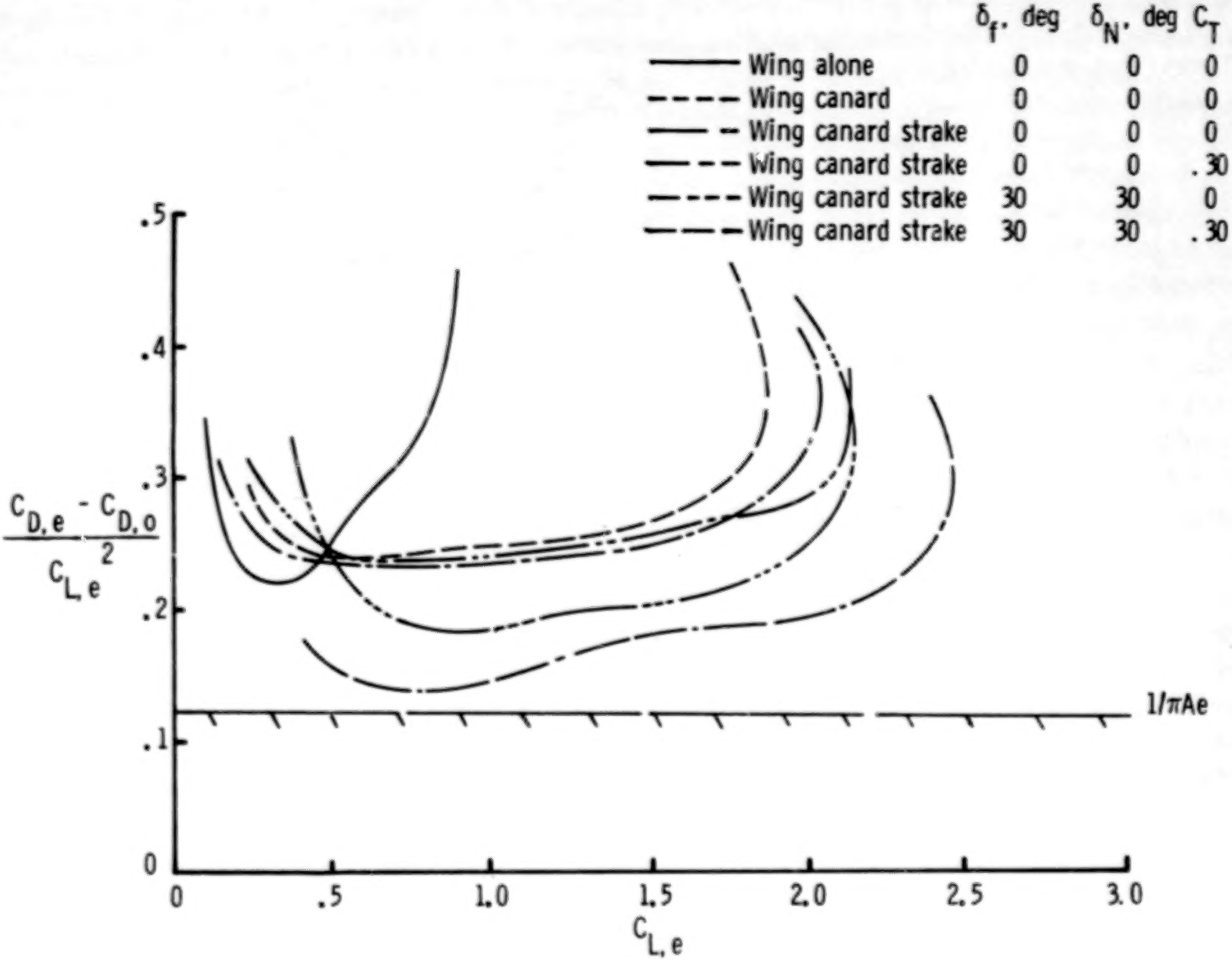
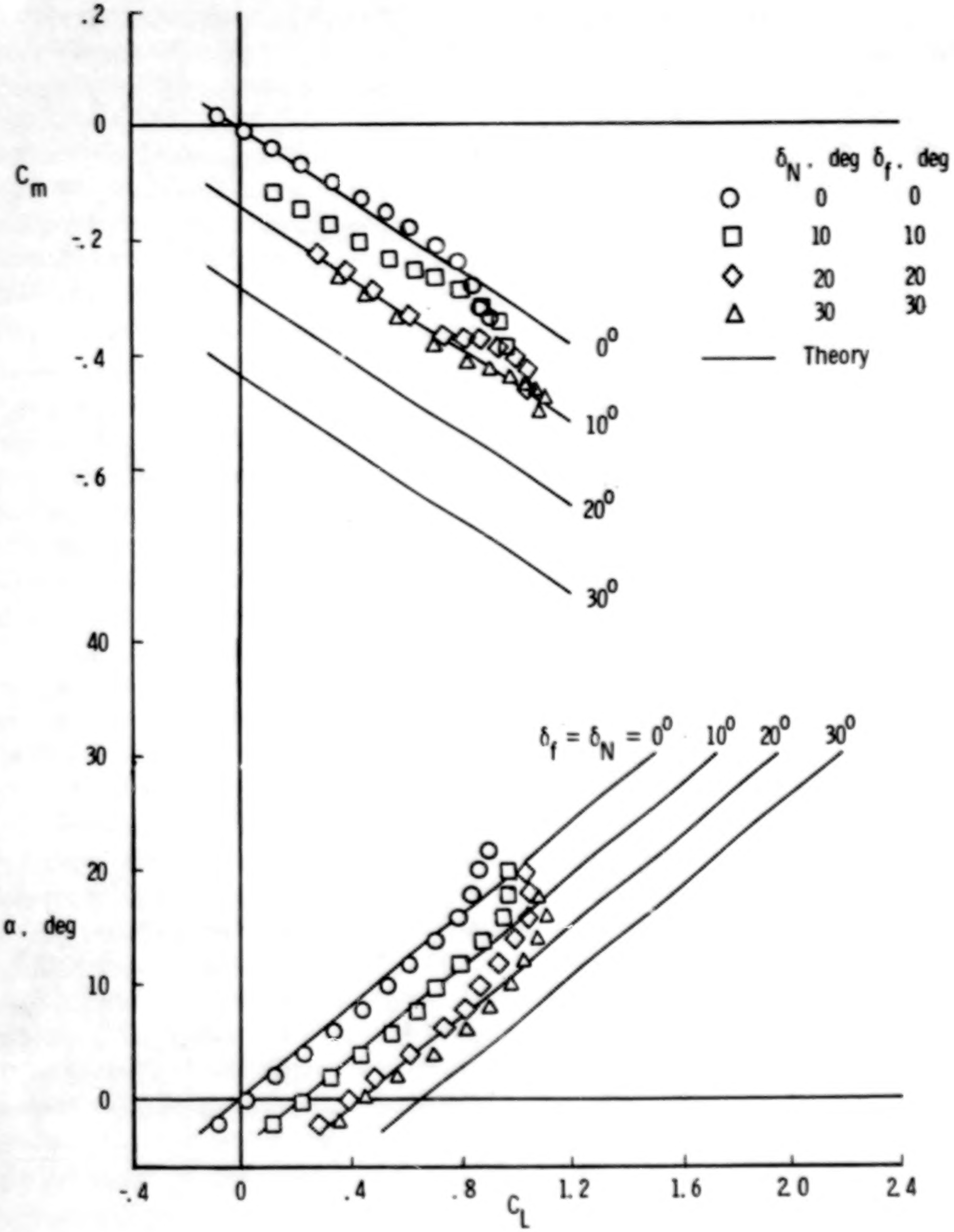
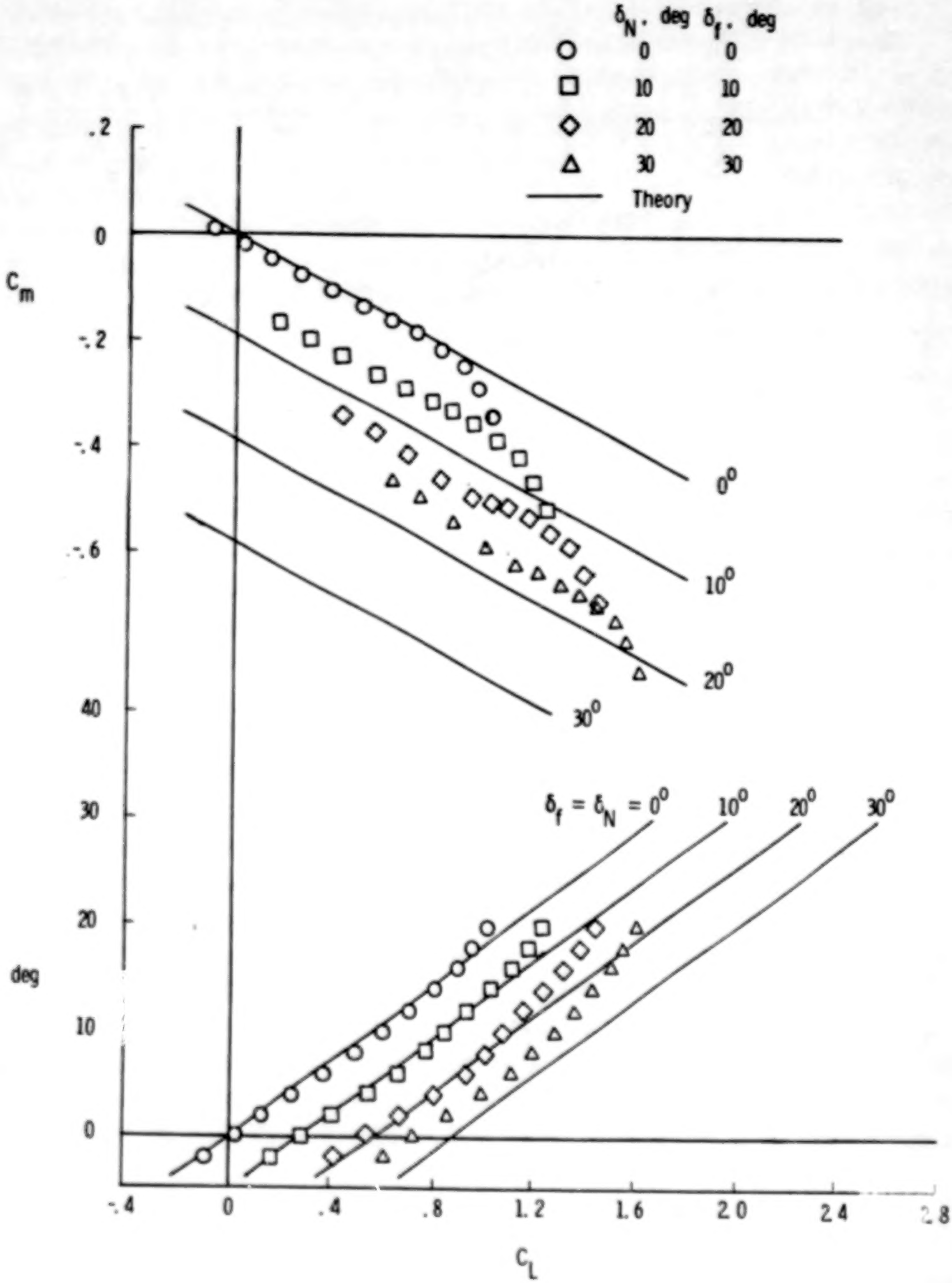


Figure 18.- Effect of configuration change, nozzle and flap deflection, and thrust coefficient on drag-due-to-lift parameter $(C_{D,e} - C_{D,o})/C_{L,e}^2$.



(a) $C_T = 0$.

Figure 19.- Comparison of wing-alone data with jet-flap theory at two thrust coefficients.



(b) $C_T = 0.30$.

Figure 19.- Concluded.

1. Report No.
NASA TP-1090

2. Government Accession No.

3. Recipient's Catalog No.

4. Title and Subtitle
EFFECTS OF DEFLECTED THRUST ON THE LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A CLOSE-COUPLED WING-CANARD CONFIGURATION

5. Report Date
December 1977

6. Performing Organization Code

7. Author(s)
Long P. Yip and John W. Paulson, Jr.

8. Performing Organization Report No.
L-11886

9. Performing Organization Name and Address
NASA Langley Research Center
Hampton, VA 23665

10. Work Unit No.
505-11-24-02

11. Contract or Grant No.

12. Sponsoring Agency Name and Address
National Aeronautics and Space Administration
Washington, DC 20546

13. Type of Report and Period Covered
Technical Paper

14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

An investigation has been conducted in the Langley V/STOL tunnel to investigate the effects of power on the longitudinal aerodynamic characteristics of a close-coupled wing-canard fighter configuration with partial-span rectangular nozzles at the trailing edge of the wing. Data were obtained on a basic wing-fuselage (wing-alone) configuration, a wing-canard configuration, and a wing-canard-strake configuration for nozzle and flap deflections from 0° to 30° and for nominal thrust coefficients from 0 to 0.30. The model was tested over an angle-of-attack range from -2° to 40° at Mach numbers of 0.15 and 0.18.

Results show substantial improvements in lift-curve slope, in maximum lift, and in drag-due-to-lift efficiency when the canard and strakes have been added to the basic wing-fuselage (wing-alone) configuration. Addition of power increased both lift-curve slope and maximum lift, improved longitudinal stability, and reduced drag due to lift on both the wing-canard and wing-canard-strake configurations. These beneficial effects are primarily derived from boundary-layer control due to moderate thrust coefficients which delay flow separation on the nozzles and inboard portion of the wing flaps.

17. Key Words (Suggested by Author(s))
Canard strakes
Wing-canard configuration
Two-dimensional deflected thrust

18. Distribution Statement
Unclassified - Unlimited

Subject Category 02

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	86	$6.00

* For sale by the National Technical Information Service, Springfield, Virginia 22161

NASA-Langley, 1977